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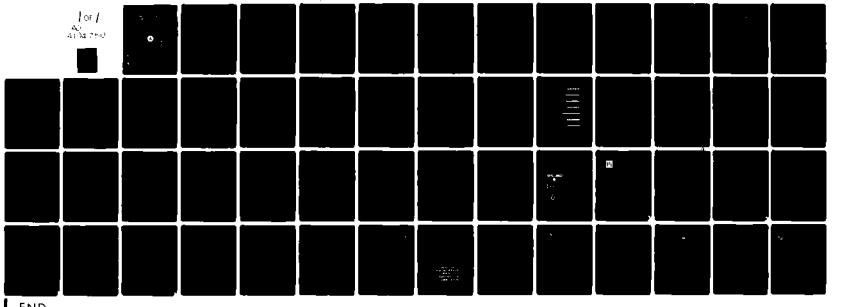

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COLUMBUS, OHIO, VOICE RESPONSE SYSTEM DEMONSTRATION AND EVALUATION

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FINAL REPORT

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16. Abstract

The Voice Response System (VRS) was subjected to a 4-month demonstration in the Columbus, Ohio, Flight Service Station (FSS) preflight area.

The purpose of the experiment was to test and evaluate the VRS system, user acceptance, and the effects on the specialists/facility workload, and to determine the general impact of VRS on the Columbus (CMH) FSS preflight area.

In addition, the test permitted collection of technical performance data which could serve as the framework for an integrated national system for the mass dissemination of weather information.

It is concluded that the VRS caused a shift in user demand/preference, reduced FSS briefer workload, reduced demand for basic pilots automatic telephone weather answering service (PATWAS), and was determined to be acceptable to the general aviation user.

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PREFACE

Numerous organizations and individuals participated in the Voice Response System (VRS) demonstration conducted in the Columbus, Ohio, area during December 1979 through April 1980. Thus, it seems only appropriate that their contributions to this project be acknowledged as follows:

1. Transportation Systems Center of Cambridge, Massachusetts, and MITRE Corporation of McLean, Virgina, for their contributions in system design, equipment description, and data reduction support for this report.

2. Ms. Jacqueline Rehmann and Mr. Edward Jaggard of Data Transformation Corporation for their valuable assistance in providing the required programing support for data reduction and analysis.

3. The Federal Aviation Administration's (FAA's) Great Lakes Region for their commitment to the Flight Service Station (FSS) automation program by supporting the Columbus area VRS demonstration. Acknowledgment is given to Mr. Howard Freund, Chief of the Columbus FSS, and his staff for hosting and supporting the data collection effort during both the "before" and "after" phases.

4. Mr. Charles Murray and Mr. Carey Weigel of ARD-441, Project Managers for VRS development, System Research and Development Service, Washington, D.C. Additionally, Mr. Murray provided preparation and review expertise germane to this document.

5. Mr. James Talotta, ACT-250, and Mr. Robert Meisner, ACT-63A, for their cooperative efforts in coordinating and developing the "Pilot Awareness" program viewed on WOSU's Television AM Weather Show in the Columbus, Ohio, area.

6. Mr. John Gallimore, Program Manager ACT-250, for his important contribution to the conceptual design of the evaluation effort and invaluable suggestions which served to improve the results of this study; and other personnel of the Flight Service Station Branch who spent the many hours required to reduce voice tapes necessary to this report.

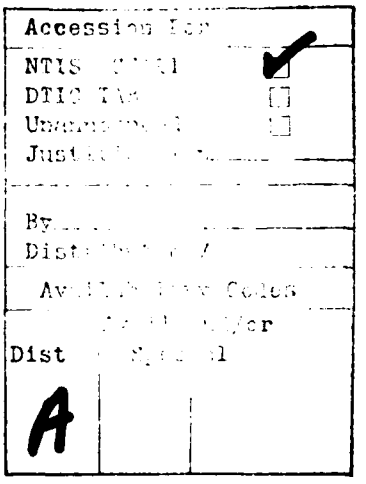


TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	vii
INTRODUCTION	1
Purpose	1
Background	1
METHODOLOGY	1
Data Collection	2
Weather Mix	2
Specialist Availability	2
VRS Familiarization	2
Statistical Data Collection	3
ANALYSIS	3
Question Number 1	3
Question Number 2	8
Question Number 3	8
Question Number 4	10
CONCLUSIONS	15
APPENDICES	
A - Equipment Description	
B - Data Reduction	
C - The Voice Response System User Information	
D - Unsolicited Letters	

LIST OF ILLUSTRATIONS

Figure		Page
1	Comparison of Weather Conditions Before and After Study	4
2	Comparison of Pilot Briefs Before and After, Specialists Available, and VRS During Similar Weather Conditions	5
3	PATWAS Activity	7
4	Frequency Distribution of Before and After Preflight Pilot Briefing Durations (All Samples)	9
5	Lost Call Analysis	13
6	Calls Waiting Analysis	14
7	After Study Analysis	16
8	Summary of Services Mix Before and After	18
9	Analysis of Lost Calls To Service Demand and Specialist Availability	19

LIST OF TABLES

Table		Page
1	Weather Related Services (Totals)	6
2	Demand Analysis	6
3	Change in Capacity	10
4	Preflight Transaction Time Analysis	11
5	System Performance Comparison (Totals)	12
6	Capacity and Specialist Productivity	15

EXECUTIVE SUMMARY

During the period December 1979 through March 1980, the Federal Aviation Administration (FAA) conducted an onsite test in the Columbus, Ohio, Flight Service Station (FSS) area to determine the effectiveness and the acceptability of the Voice Response System (VRS). Specifically, a 7-day "before" and "after" VRS study was designed and conducted. The data collection in the before phase was conducted at the Columbus FSS from November 8 through 14, 1979. The after phase took place January 31 through February 6, 1980. Each study was identical in duration; daily time period, 0600 to 1800 eastern standard time (EST); and type of data collected.

The VRS is designed to provide the pilot/user with limited preflight planning information, accessible via touch-tone telephone, without first contacting the FSS specialist. The present system provides three basic weather products: hourly surface observations, terminal forecasts, and grid winds aloft. Information is communicated by voice in one direction — from computer to pilot.

The Columbus study focused attention on four questions posed by Congress and FAA management. These questions and the answers resulting from this study are as follows:

1. Will pilots use the Voice Response System? Data analyses show that 812 pilots used the system during the after collection period (7 days, 0600 to 1800 EST). This represents 28 percent of the total demand (pilot briefs, pilots automatic telephone weather answering service (PATWAS), and VRS) for this same period. It is believed that pilot usage of the system will be increased as confidence, experience, and proficiency with the system improves. Since the demonstration period during the months of January and February 1980, approximately 8,200 VRS calls have been recorded.

2. After using the VRS, will pilots require or elect to call the FSS specialist? Of the 812 pilots that used the system during the after collection period, 124 pilots called the FSS specialist. Pilots calling the specialist represent 15 percent of the total.

3. What is the impact of the Voice Response System on the FSS specialist? The following parameters affecting specialist workload changed, based on analysis of the data collected:

a. Mean length of call (transaction time); i.e., all briefings reduced by 0.16 minute.

b. Mean length of call for specialist briefing with VRS reduced by 0.50 minute.

c. Potential capacity of the specialist increased by one call per hour.

d. VRS usage resulted in a shift from the specialist-provided briefs and PATWAS.

e. When comparing similar specific weather conditions, the Instrument Flight Rules (IFR) transaction times were reduced by 1.31 minutes.

4. What is the impact of VRS on the Columbus Preflight Area? The overall system utilization in the after study improved, which indicates an increase in capacity and specialist productivity. This change was evidenced even with fewer specialists available in the after study; however, a higher level of specialist output, based on the decrease in mean service times and a decrease in lost calls, was apparent. Although the VRS required a modified briefing for pilots using the system, it was noted that a complete briefing was given more often. This factor may have detracted from the likelihood that the specialist briefing times could have been further reduced.

INTRODUCTION

PURPOSE.

This report presents the results of analysis of data gathered prior to (before) and during (after) a demonstration of the Voice Response System (VRS) in the Columbus, Ohio, Flight Service Station (FSS) Area. The demonstration was planned to provide useful data (1) on the degree of pilot acceptance and utilization of VRS, (2) on the impact to workload of the individual specialist and of the facility, and (3) on the likely impact of the agency's proposed automated self-briefing system (based on the VRS) on the Columbus FSS preflight area.

BACKGROUND.

The report of the House Appropriations Committee on the fiscal year 1980 Budget Submission for the FSS program expressed concern about the benefits to be derived from the Flight Service Station Automation Program which had been approved by the Federal Aviation Administration (FAA) in January 1978. The Committee was particularly concerned about the pilot acceptance and utilization of the automated self-briefing system currently under development by the FAA. Specifically, the report stated that:

"At such time as additional funding is requested for this program, the Committee expects FAA to be able to demonstrate that a substantial number of pilots will actually use this automated self-briefing system without also requiring a briefing by a flight service specialist."

The agency's Flight Service Station Automation Program consists of Model I, II, and III systems which will effectuate automation in several stages Models I and II mainly accomplish the automation of the specialist functions (data retrieval, flight plan filing, etc.) and will be implemented in the early 1980's. The Model I and II systems contain some of the hardware and software needed for the Model III system. The Model III system will provide the direct user access to the automated self-briefing system and should reduce the need for the pilot to contact the flight service specialist. The Systems Research and Development Service has an automated self-briefing system, called the Voice Response System (VRS), under development and test. Appendix A details and fully describes this VRS equipment. In addition, there are several other enhancement efforts underway which will interface with the VRS to further reduce the need for specialist services. It is expected that the automated self-briefing system will decrease pilot and specialist contacts.

The VRS has been tested operationally in the Washington (DCA) FSS area since April 1978, and in the Columbus, Ohio, FSS area since December 1979. During the month of January 1980, the Columbus FSS specialists provided 10,234 pilot briefs. During this same period 4,242 VRS calls were recorded. VRS comprised 29.3 percent of the total number of services. The VRS system presently provides the pilot with three weather products: surface observations, terminal forecasts, and grid winds. The products do not constitute a complete briefing; however, they do provide enough weather information for the pilot to make a decision as to whether to proceed to the airport. Additional products are being developed (i.e., pilots automatic telephone weather answering service (PATWAS), transcribed weather broadcast (TWEB) routes, etc.) which will be added to the system in the near future.

METHODOLOGY

A "before" and "after" VRS study was designed and conducted in order to

obtain the needed data for analysis. In October 1979, a brochure (figure C-1) was mailed to approximately 4,400 registered general aviation pilots residing in the demonstration area. The brochure explained the reason for the demonstration — what the VRS is, and how to use it. The data collection in the before phase was conducted at the Columbus FSS from November 8 through 14, 1979. The after phase took place January 31 through February 6, 1980. In order to provide a basis for comparison, each study was identical in duration (7 days), daily time period covered (0600 to 1800 eastern standard time), and elements of data collected. This time period was chosen to provide representative activity levels within the facility.

DATA COLLECTION.

Data elements were collected using a Telephone Information and Control System (TICS). Hourly measurements were taken for the following:

1. The number of calls processed.

2. Call duration (transaction time).

3. The number of calls waiting.

4. Total waiting time.

5. Distribution of transaction time in 1/2-minute increments.

6. All trunks busy.

In addition to the above data, project personnel collected the following data:

1. Hourly weather observations from Service A.

2. Specialist availability.

3. Work samples.

4. Pilot briefing activity.

5. PATWAS activity.

6. VRS activity.

7. Number of lost calls.

For reader reference, a four-page summary of data collected during the before and after studies has been included in appendix B.

WEATHER MIX.

Weather observations from five reporting stations in the Columbus flight service area were noted. The predominant weather condition and criteria for the hour were classified as instrument flight rules (IFR), ceilings less than 1,000 feet and visibilities less than 3 miles; marginal flight rules (MVFR), ceilings 1,000 to 3,000 feet and visibilities 3 to 5 miles; or visual flight rules (VFR), ceilings better than 3,000 feet and visibilities better than 3 miles.

SPECIALIST AVAILABILITY.

The number of specialists available was determined by observations which were taken on cue at approximately 10-minute intervals. A specialist was considered available for preflight briefing if the following criteria were met: (1) He was assigned preflight as a primary duty. (2) The specialist was physically at the position. A percentage was computed of specialists available for preflight briefing duties to specialists assigned preflight duties. The sampling method provided actual specialist availability for a given hour.

VRS FAMILIARIZATION.

Following the before phase and prior to the after phase, a pilot education program on the VRS was conducted in the demonstration area in November 1979. This program made pilots aware of the test and educated them in accessing

and using the system. A mass mailing containing literature pertaining to the demonstration was sent to 4,400 licensed pilots in the Columbus flight service area. In addition, a television presentation was shown in conjunction with the nationwide TV program "AM Weather," and major "Fixed Base Operations" offices were visited by FAA personnel to demonstrate the VRS. An example of literature mailed to area pilots as well as information pertaining to the TV program is included for reader reference in appendix C.

STATISTICAL DATA COLLECTION.

The VRS equipment gathered its own statistical data. The system tallied the number of users by channel, hour, average length of call, and number of simultaneous users. In order to determine whether a pilot used the VRS and required the services of a specialist, the specialist asked pilots during the after phase if they used the VRS prior to calling. Magnetic tape recordings for each day were manually reduced to obtain the number of pilot briefings.

ANALYSIS

This section presents the analysis of the data collected during the before and after phases of the Columbus demonstration. The analysis and results are the basis for answers to the following questions:

1. Will pilots use the VRS?

2. After using the VRS, will pilots require or elect to call the FSS specialist?

3. What is the workload impact to the specialist and facility?

4. What is the general impact of the VRS on the Columbus preflight area?

QUESTION NUMBER 1. WILL PILOTS USE THE VRS?

To answer this question, the pilot usage of each of the methods for providing pilot briefs (i.e., specialist, VRS) was examined in both the before and after study. Weather conditions for the two periods were compared to find out if the results might be influenced by significantly different mixes of weather. The weather mix for the before and after phases is considered to be a typical cross section of weather types for the Columbus area. Hourly observation totals for IFR, VFR, and MVFR were calculated, and a test of their significance was performed.

The test at the 0.01 level indicated a significant difference in type of weather. Figure 1 depicts the percent of each type of weather (IFR, VFR, and MVFR) for the 7-day before and after phases. Figure 2 depicts the comparison of pilot briefs (before/after) and VRS during similar weather conditions.

Throughout the before phase, the total demand for weather-related services was divided between specialist pilot briefs and PATWAS. Table 1 shows the actual number of calls recorded for the 12-hour sample period.

Table 2 shows that pilot briefs accounted for 66 percent of the total demand and PATWAS, 34 percent. With the introduction of VRS, the demand shifted as noted in the column headed "after." The percent of PATWAS decreased to 25 percent with VRS accounting for 28 percent of the demand in the after phase. (See figure 3.)

Based on the information presented, it is believed that:

1. Pilots will use the VRS.

2. Slightly higher activity was recorded during the before phase which

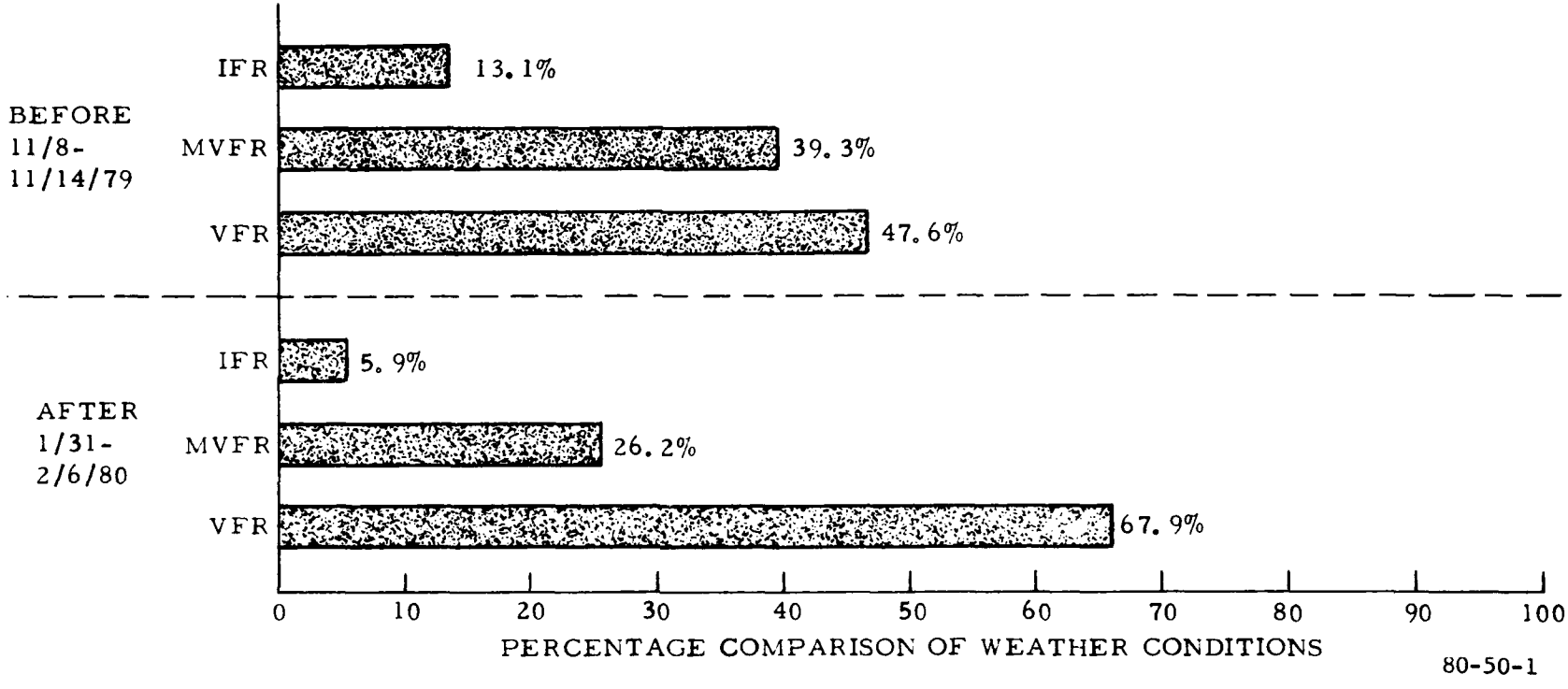


FIGURE 1. COMPARISON OF WEATHER CONDITIONS BEFORE AND AFTER STUDY

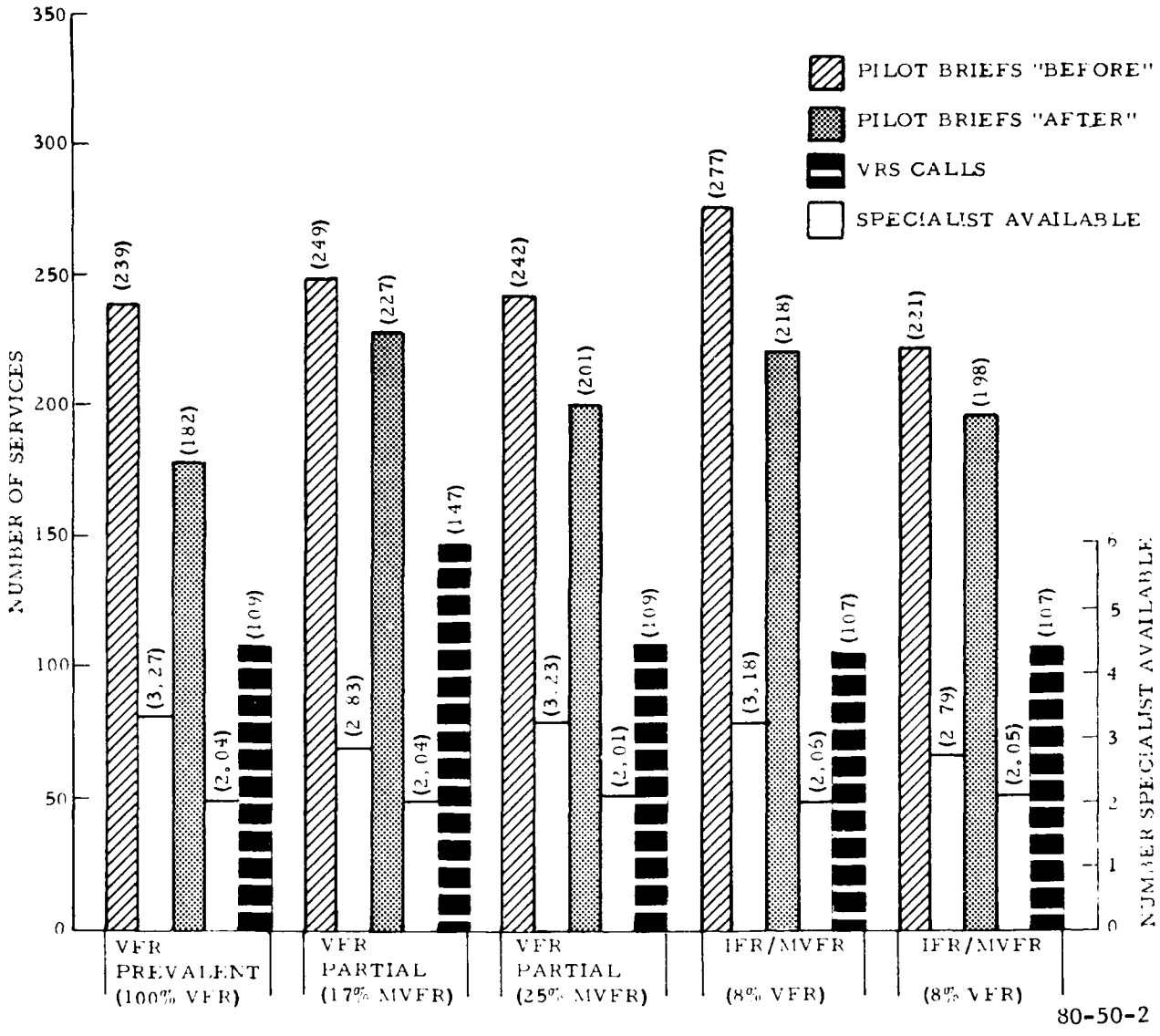


FIGURE 2. COMPARISON OF PILOT BRIEFS BEFORE AND AFTER, SPECIALISTS AVAILABLE, AND VRS DURING SIMILAR WEATHER CONDITIONS

TABLE 1. WEATHER RELATED SERVICES (TOTALS)

BEFORE

Day	1	2	3	4	5	6	7	Mean	Total	Percent Of Demand
Pilot Briefs	235	277	221	226	239	249	242	241	1689	66
PATWAS	113	157	185	169	75	98	66	123	863	34
Total								364	2552	100
Spec.*	2.87	3.18	2.79	3.48	3.27	2.83	3.23	3.09		

AFTER

Day	1	2	3	4	5	6	7	Mean	Total	Percent Of Demand
Pilot Briefs	198	182	227	201	151	216	218	199	1393	47
PATWAS	89	79	163	145	79	91	111	108	757	25
VRS	107	102	147	109	119	121	107	116	812	28
Total								459	2962	100
Spec.*	2.05	2.04	2.04	2.01	2.43	2.06	2.06	2.10		

*Denotes mean number of specialists available based on 12-hour observation period.

TABLE 2. DEMAND ANALYSIS

Weather Related Services	Before Percent	After Percent	Character Of Change
Pilot Briefs	66	47	Decrease
PATWAS	34	25	Decrease
VRS		28	Increase

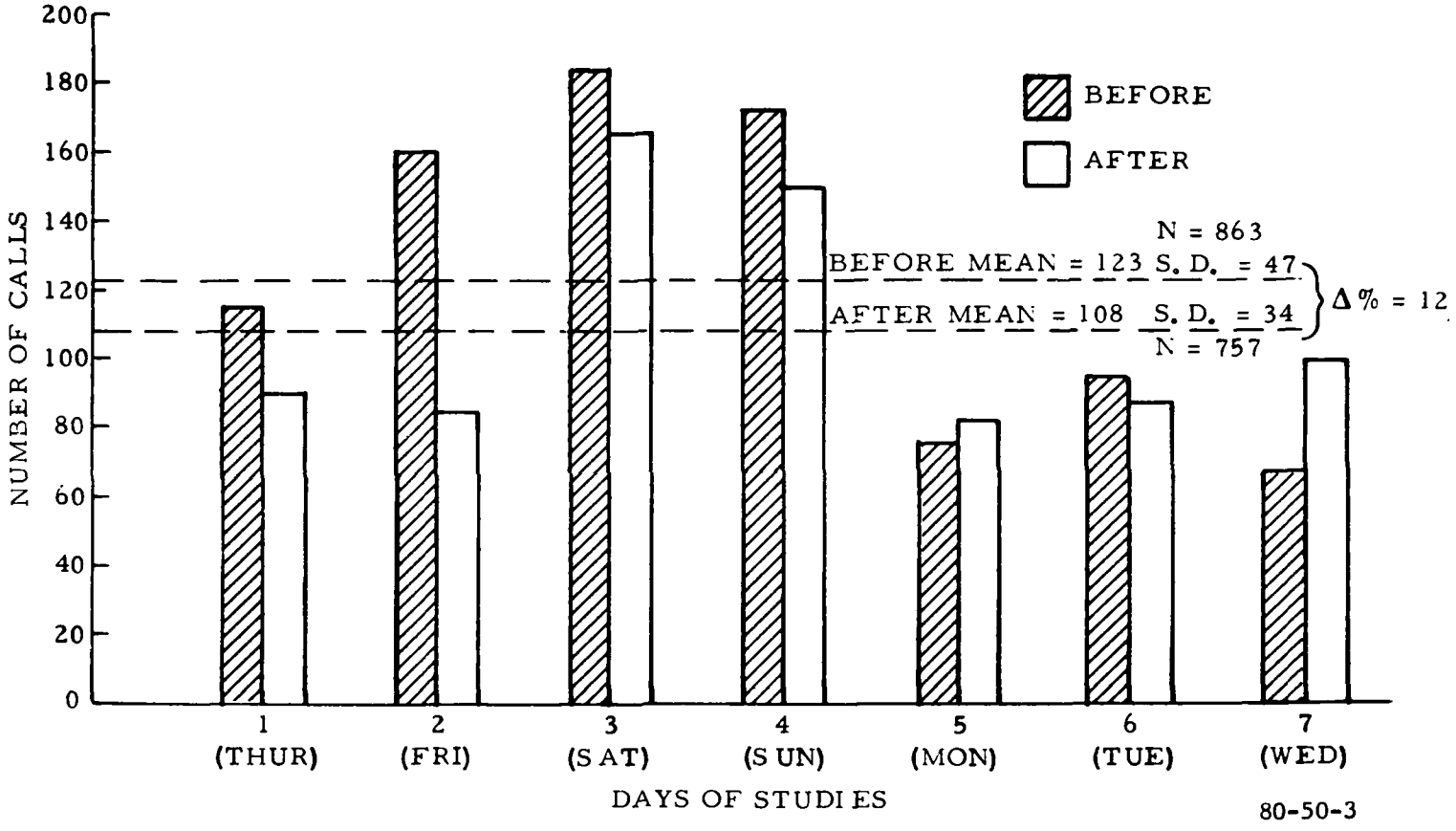


FIGURE 3. PATWAS ACTIVITY

was weather related. There was a higher percentage of IFR/MVFR weather in the before phase (52.4 percent) than in the after phase (32.1 percent). (See figure 1.)

3. Pilot usage of the VRS will increase as confidence, experience, and proficiency with the system improves.

4. Pilot usage of the VRS will increase as the number of products provided by the system increases.

QUESTION NUMBER 2. WILL THE PILOT ELECT TO CALL THE FSS AFTER RECEIVING VRS?

The VRS provided the pilot with three basic products: (1) surface observations (SA's), (2) terminal forecast (FT's), and (3) grid winds. The pilot is then advised by the VRS recorded message to call the FSS specialist for a complete briefing should he decide to fly.

To help determine the number of pilots who elected to call the FSS after receiving VRS, the standby telephone message to the pilot who is not answered immediately was changed to include a statement, "Advise the briefer if you have listened to the VRS for this proposed flight. Your briefing will be modified accordingly." In addition, the Columbus specialists were advised to ask specifically if their caller had received VRS prior to calling as a double measure of accuracy. This information was annotated on the preflight position briefing log. The results of the information obtained reveal that for the 7-day study period (0600 to 1800 local time), 124 out of 812 pilots (15 percent of VRS users) elected to call the FSS. This leaves a total of 85 percent of VRS users who did not call the specialist.

QUESTION NUMBER 3. WHAT IS THE WORKLOAD IMPACT OF VRS ON THE FLIGHT SERVICE SPECIALIST?

In order to determine the workload impact of VRS on the flight service specialist, the following data from the before and after studies are considered:

1. Duration of preflight activity or average call length.

2. Average call length by similar weather type.

3. Shift in demand for pilot briefs and other weather related services; e.g., PATWAS.

The following formula was used to calculate the average, or mean, call length:

$$\text{Mean length of call} = \frac{\text{total duration of calls per hour}}{\text{total number of calls per hour}}$$

A review of the mean call length in the before study reveals a value of 2.81 minutes. In the after study the average call length decreased to 2.65 minutes, a difference of 0.16 minute, in pilot brief transaction time. (See figure 4.) A decrease in the average call length is inversely proportionate to the number of calls a specialist may handle in 1 hour. That is, as the mean call length decreases, the capacity of each specialist for that hour increases. In order to calculate the actual change in capacity in the before and after study, the following formula is used:

$$\text{Specialist capacity} = \frac{\text{man-minutes per hour}}{\text{adjusted transaction time}}$$

Based on past history, the total man-minutes per hour is 50 minutes. The adjusted transaction time is equal to the mean call length plus 30 seconds (0.5) to account for the other duties

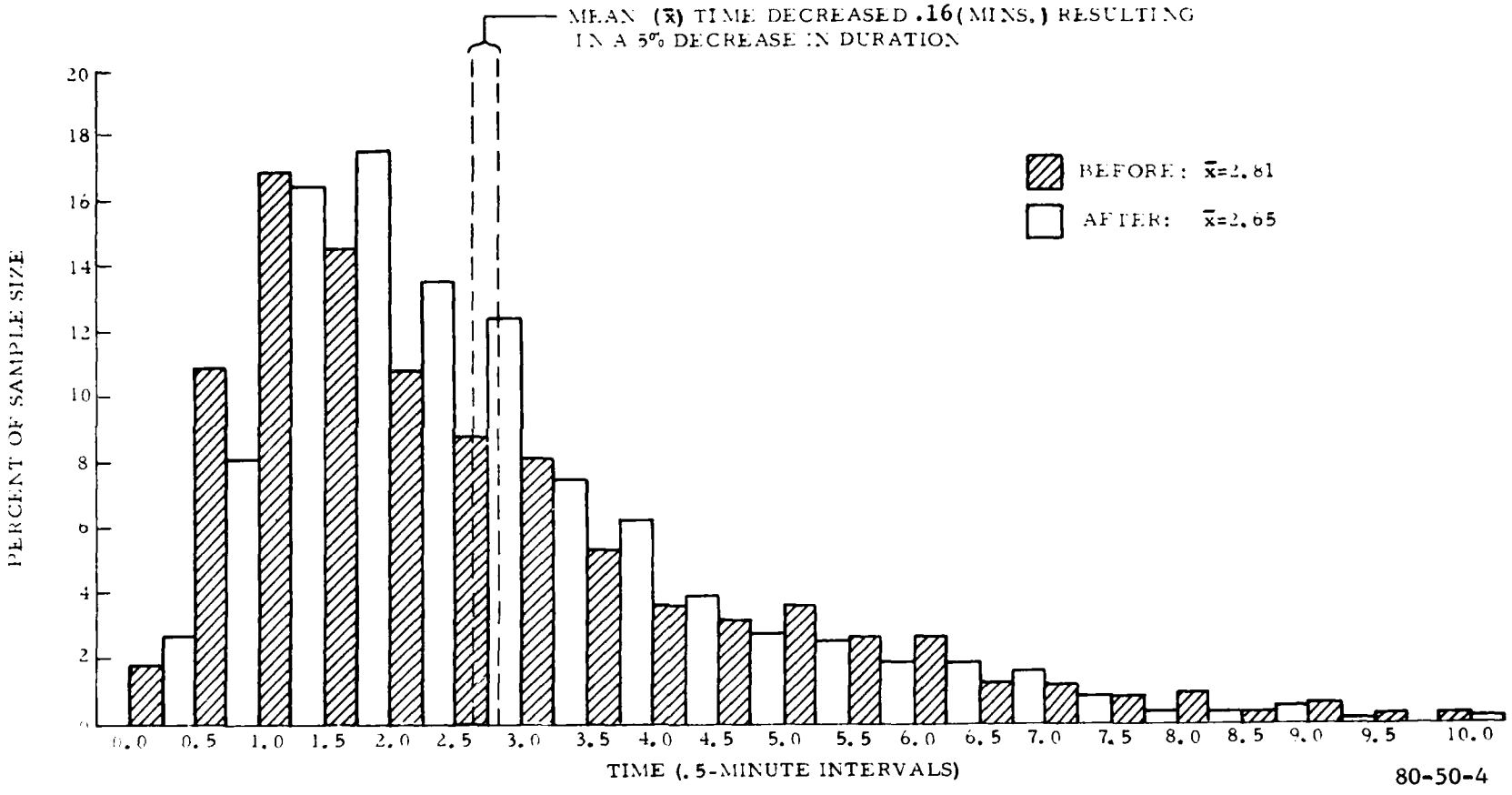


FIGURE 4. FREQUENCY DISTRIBUTION OF BEFORE AND AFTER PREFLIGHT PILOT BRIEFING DURATIONS (ALL SAMPLES)

associated with answering a call; i.e., organizing weather data, putting papers away. The total number of calls that one specialist can handle per hour is indicated in table 3. Thus, the specialist capacity increased by 0.77 calls per hour in the after study.

TABLE 3. CHANGE IN CAPACITY

Predicted Number Of Calls	Before	After
(1 Specialist)	15.10	15.87

To compare the activity by weather type for IFR, VFR, and MVFR, a similar number of calls was compared in the before and after totals. For example, the total number of calls in which VFR was observed in the before study was 856 calls, for a total of 2,364 minutes. A similar number of calls was compared in the after study; i.e., 861 calls for 2,294 minutes. Computing an average call length for VFR conditions reveals a similar value in the before and after studies, that is 2.76 minutes and 2.66 minutes, respectively. MVFR weather comparison reveals a similar average call length of 3.26 minutes to 3.27 in the after study.

IFR conditions reveal a more drastic reduction in average call length. For the same number of calls, the average call length decreased in the after study by 1.31 minutes. A two-tailed test of significance at the 0.05 level reveals this difference to be of statistical value and a significant factor for consideration during complex weather and briefing situations. These values are reflected in table 4.

Another aspect considered to address the workload impact on the specialist is shift in demand for services. VRS caused a shift in the demand for pilots briefs and the PATWAS. The total demand for pilot briefs decreased from 66 to 47 percent which is equivalent to a 28 percent change in demand. The demand for PATWAS shows a similar decrease from 34 to 25 percent, a change of 26 percent. VRS calls accounted for 28 percent of the demand in the after study. These figures are shown in table 2.

The final measure of specialist performance was computed using the differences between mean transaction times for the complete specialist briefing and transaction time for a modified briefing for VRS users. The mean service time in the after study for a complete specialist briefing was 2.65 minutes (includes background and weather information); the mean transaction time for VRS users with modified briefing was 2.15 minutes (considers only weather information). A significant savings of 0.50 minute was measured. This measurement then becomes an important aspect in determining the benefits of VRS or other self-briefing systems, where such savings in time is equated to improved service and increased specialist productivity. Thus, the a priori advantage of VRS is demonstrated with the reduction in transaction time and projected increase in specialist capacity.

Reduction of data particular to VRS users (124) who called the Columbus (CMH) FSS to obtain additional information or to file a flight plan reveals that 91.2 percent (113) were asked (or volunteered) in the beginning of the call if a VRS briefing was obtained prior to calling the FSS specialist. Those who were asked in the middle or end of the briefing comprise 3.2 and 5.6 percent, respectively, of the total.

QUESTION NUMBER 4. WHAT IS THE IMPACT OF VRS ON THE COLUMBUS PREFLIGHT AREA?

The implications of the effect of VRS on the Columbus preflight area are perhaps

TABLE 4. PREFLIGHT TRANSACTION TIME ANALYSIS

(Preflight transaction times and average call lengths based on data obtained from the data collection equipment)

Before (11/8/79 - 11/14/79)

WX Type	Number Of Calls	Total Call Time (minutes)	Avg. Call Length (minutes)	Avg. Call Length All WX Types (minutes)
IFR	94	405.4	4.31	
MVFR	416	1355.8	3.26	
VFR	856	2364.0	2.76	
Total	1366	4125.2		3.02

After (1/31/80 - 2/6/80)

IFR	94	281.7	3.0	
MVFR	415	1356.8	3.27	
VFR	861	2294.0	2.66	
Total	1370	3932.5		2.87

the most decisive concerning the future of automation implementation. To assess the impact of VRS, the following data from the before and after studies are considered: (1) the total number of calls in the wait queue, (2) the average wait time, and (3) the total number of lost calls.

The relationship of lost calls and abandoned calls to the total preflight services is a distinctive factor in facility performance. The greater number of lost and/or abandoned calls limits effective system performance and unmet demand increases. In addition, lost calls and waiting time appear mutually interdependent; that is, the longer a caller has to wait for service, the more likely he is to hang up before contact. Thus, a decrease in the number of lost calls and waiting time means an increase in specialist response time. (See figure 5.)

Table 5 shows the calculated mean values for the number of calls waiting, the mean wait time (in minutes), and the number of lost calls. The percent of change was then computed. Similar calculations were done for all the items. (See figure 6.)

Significant measured changes are revealed in this data. It is postulated 22 percent fewer calls had to wait for service, since the average wait time decreased by as much as 25 percent. The number of lost calls decreased in the after analysis by 20 percent.

Table 6 depicts the changes in capacity (met demand), specialist workload, and productivity.

TABLE 5. SYSTEM PERFORMANCE COMPARISON (TOTALS)

	Before	After	Percent Change
Mean number of calls in wait queue	104	81	22.0
Mean wait time (minutes)	214	161	25.0
Mean number lost calls	25	20	20.0

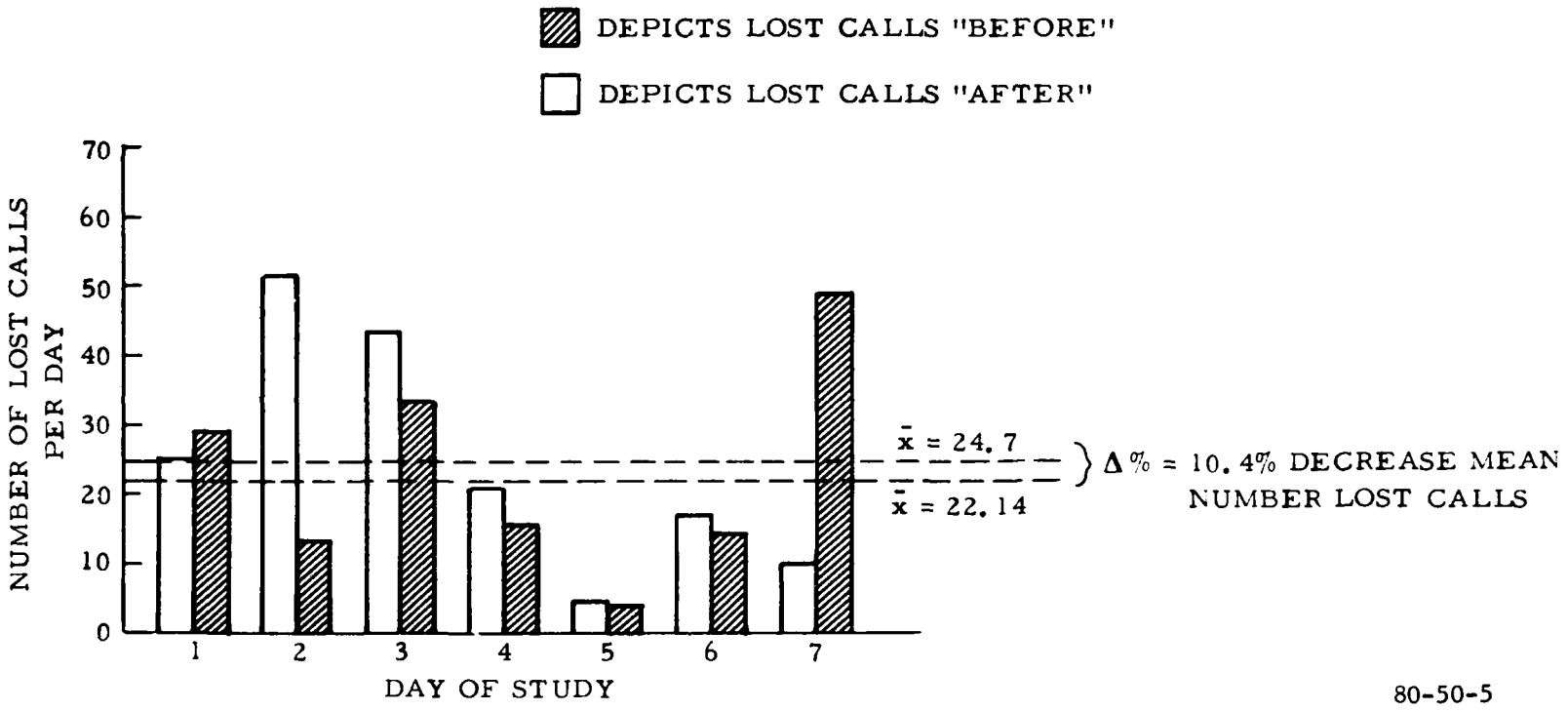


FIGURE 5. LOST CALL ANALYSIS

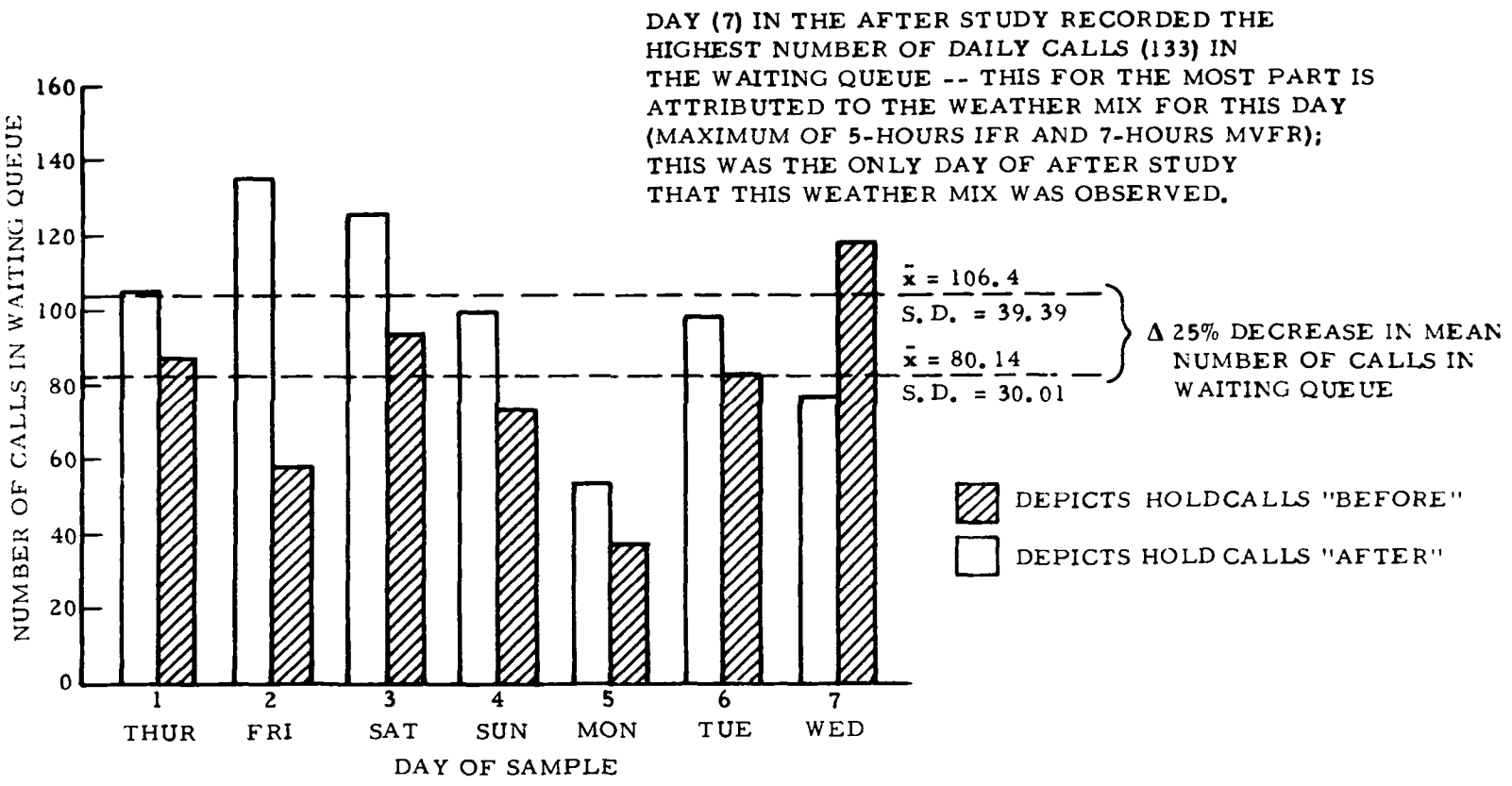


FIGURE 6. CALLS WAITING ANALYSIS

TABLE 6. CAPACITY AND SPECIALIST PRODUCTIVITY

	Before		After		
	Met Demand	No. Of Calls Waiting	Met Demand	No. Of Calls Waiting	Remarks
Pilot Briefs	1639	727	1393	568	PB's provided = productivity
PATWAS	863		757		
VRS	0		812		
System Capacity	2552		2962		increase in services by 410
Specialist Productivity	$\frac{1689}{3.09*}$ = 546.6**		$\frac{1393}{2.10*}$ = 663.3**		116.7 increase**

*Average number specialists available during study.
**Pilot briefs per specialist.

CONCLUSIONS

1. Will the pilots use the Voice Response System (VRS)?

Data analyses show that 812 pilots used the system during the after collection period (7 days, 0600 to 1800 EST). This represents 28 percent of the total demand (pilot briefs, PATWAS, VRS) for this same period. (See figure 7.) It is believed that pilot usage of the system will be increased as confidence, experience, and proficiency with the system improves. Since the demonstration period during the months of January and February 1980, approximately 8,200 VRS calls have been recorded.

2. After having used the VRS, will pilots require or elect to call the Flight Service Station (FSS) specialist?

Of the 812 pilots that used the system during the after collection period, 124 pilots called the FSS specialist. Pilots calling the specialist represent 15 percent of the total.

3. What is the impact of the VRS on the FSS Specialist?

The following parameters affecting specialist workload changed, based on analysis of the data collected:

a. Mean length of call (transaction time); i.e., all briefings reduced by 0.16 minute.

b. Mean length of call for specialist briefing with VRS reduced by 0.50 minute.

c. Potential capacity of the specialist increased by one call per hour.

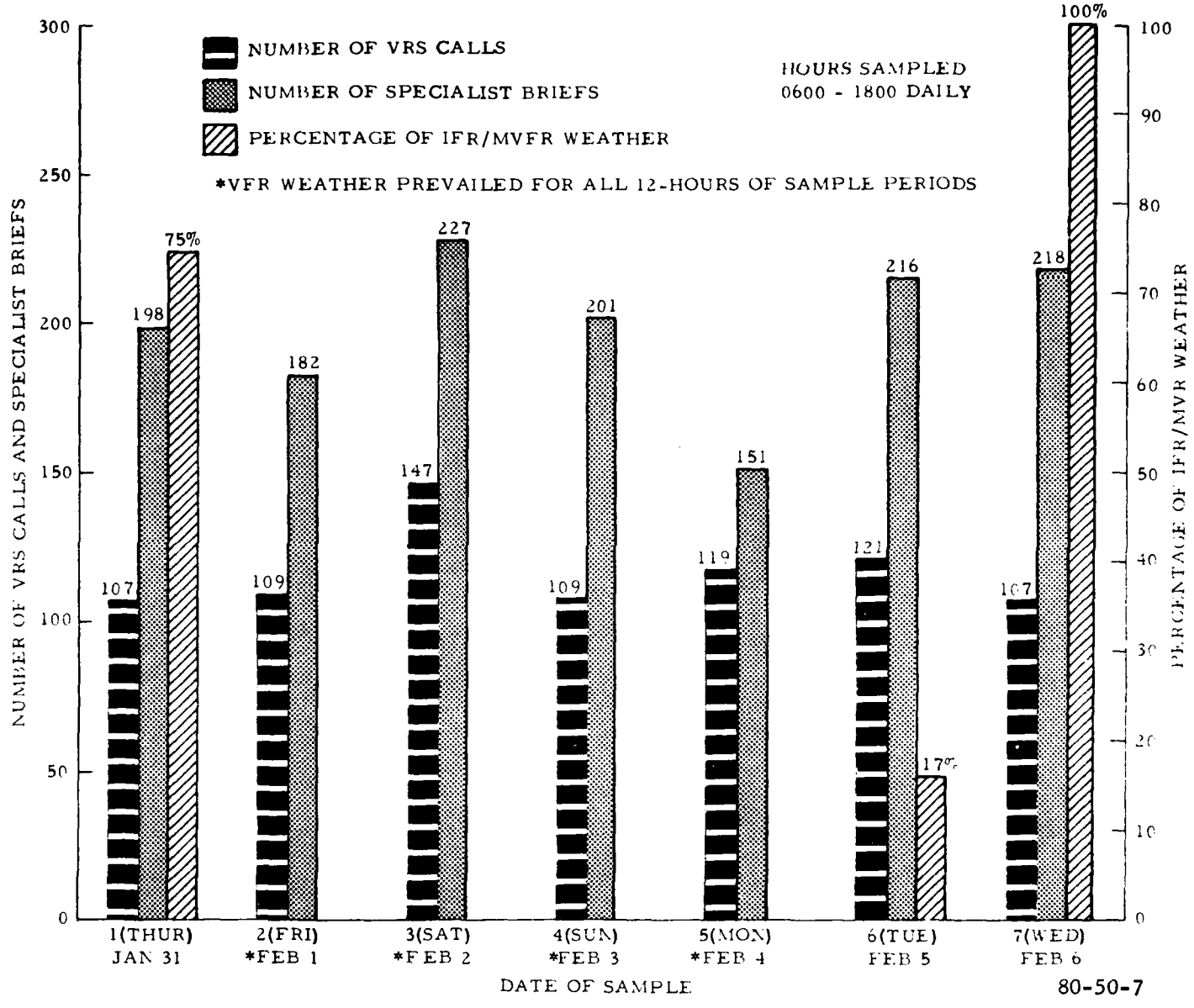


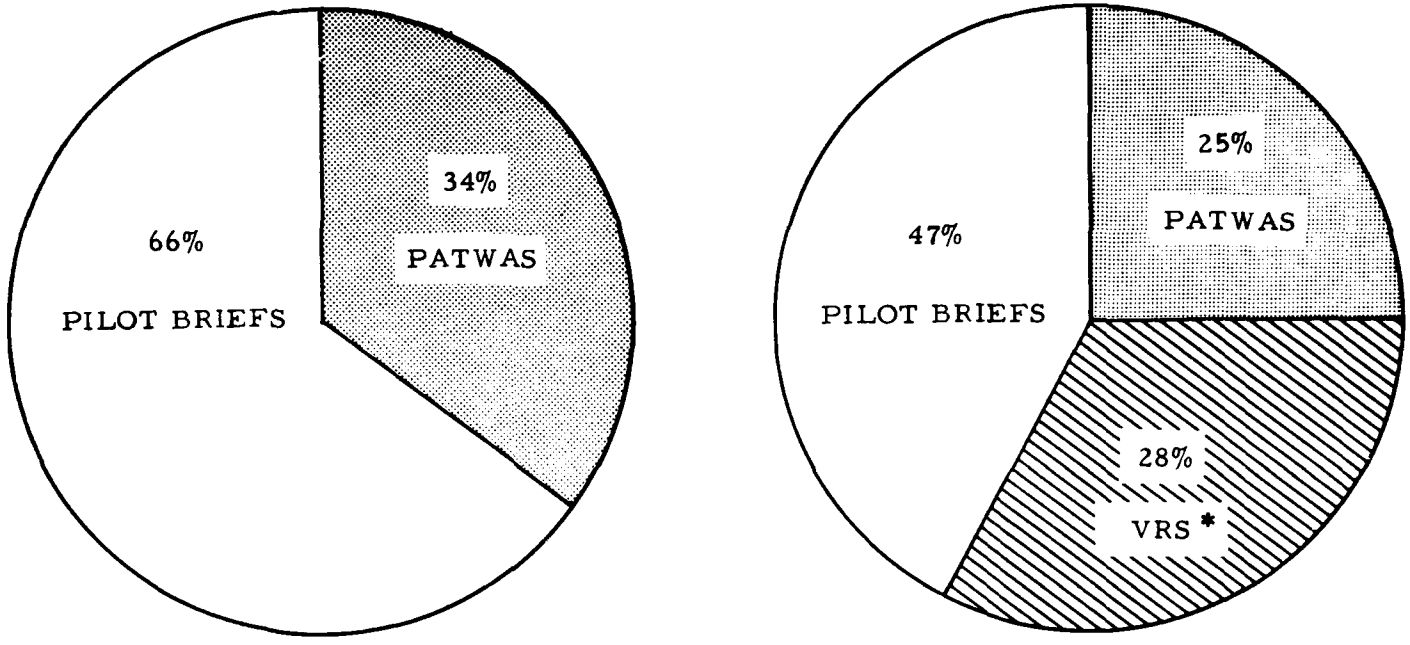
FIGURE 7. AFTER STUDY ANALYSIS

d. VRS usage resulted in a shift from the specialist-provided briefs and PATWAS. Figure 8 shows the percentage changes in services mix before and after VRS.

e. When comparing similar specific weather conditions, the Instrument Flight Rules (IFR) transaction times were reduced by 1.31 minutes.

4. What is the impact of VRS on the Columbus preflight area? The overall system utilization in the after study improved which indicates an increase in capacity and specialist productivity. (See table 6.) This change was evidenced even with fewer specialists available in the after study; however, a higher level of specialist output, based on the decrease in mean service times and a decrease in lost calls, was apparent. (See figure 9.) Although the VRS required a modified briefing for pilots using the system, it was noted that a complete briefing was more often given. This factor may have detracted from the likelihood that the specialist briefing times could have been further reduced.

*VRS IMPLEMENTED DEC. 1, 1979



BEFORE STUDY
11/8-11/15/79

AFTER STUDY
1/31-2/6/80

80-50-6

FIGURE 8. SUMMARY OF SERVICES MIX BEFORE AND AFTER

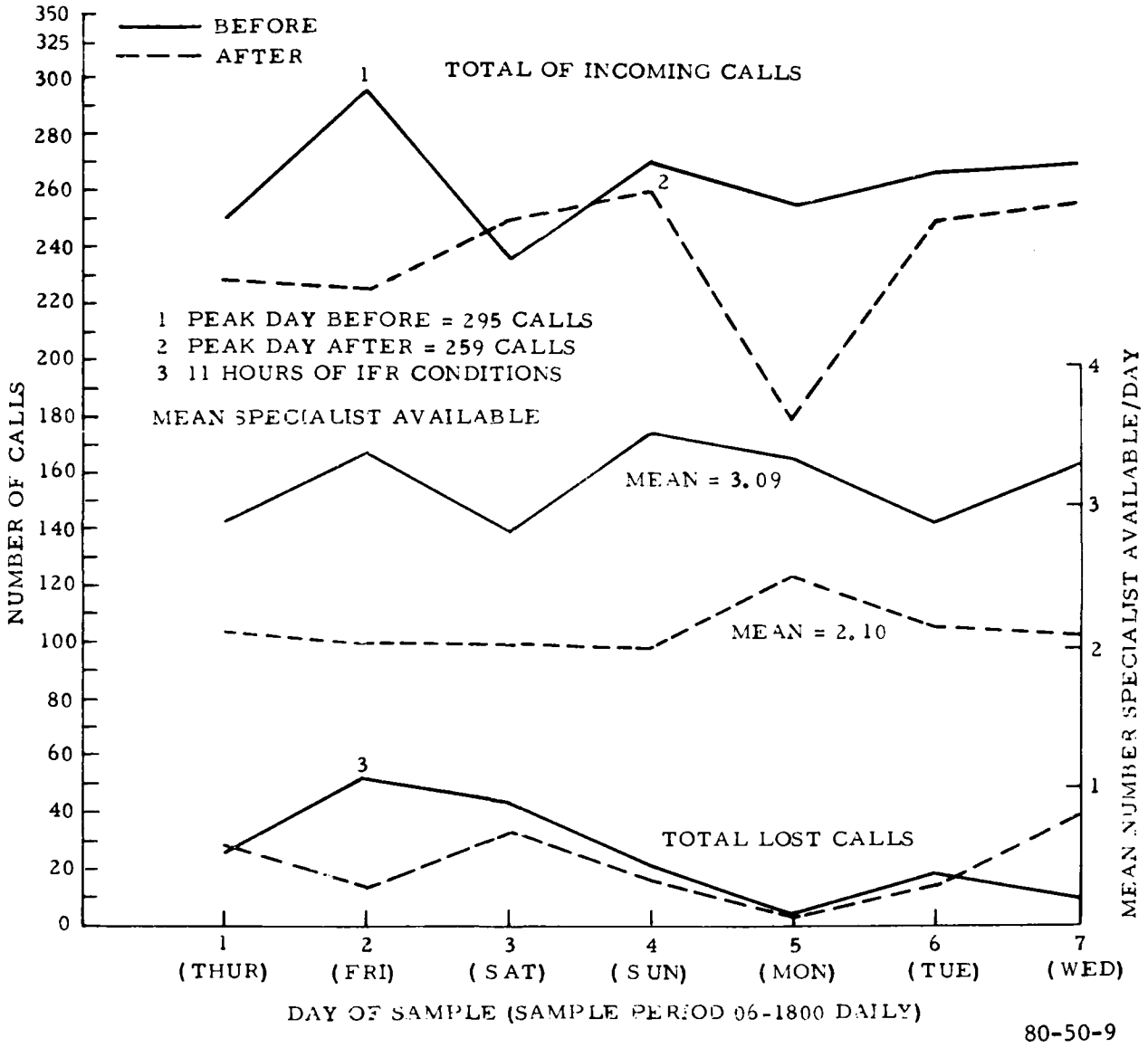


FIGURE 9. ANALYSIS OF LOST CALLS TO SERVICE DEMAND AND SPECIALIST AVAILABILITY

APPENDIX A

EQUIPMENT DESCRIPTION

The Voice Response System (VRS) provides computer-generated voice output in response to inputs from a Touch-Tone™ telephone. Stored within a Digital Equipment Corporation PDP 11/70 computer were the executive/operational programs required to operate the system and the raw national weather data base received from the Weather Message Switching Center (WMSC) located in Kansas City, Missouri. The data base was translated and reformatted into VRS weather files. All data manipulations regarding currency and validity of the national weather data base were accomplished within this computer which was located at the MITRE Corporation facility, McLean, Virginia.

The digitized voice response subsystem was located at the MITRE Corporation facility, McLean, Virginia, and was connected to the PDP 11/70 by a 1,200-baud subchannel of a multiplexed 9,600-baud communication line. The digital subsystem is composed of four major elements; i.e., processor, fixed-head disk, and Touch-Tone/voice-decoding equipment.

The processor is a Digital Equipment Corporation PDP 11/34 minicomputer with 64K of core memory. It performs the functions of interpreting the Touch-Tone inputs from the user, determining what weather information has been requested, accessing the proper weather files in the PDP 11/70, and coverting the output into speech by stringing together prestored words and phrases which result in the appropriate output message.

The fixed-head disk was used to store spoken words and phrases which had previously undergone an analog-to-digital conversation. The digital output was compressed utilizing a technique known as adaptive differential pulse code modulation (ADPCM).

The process of decompressing the data stored in the disk upon retrieval was performed by the speech decoding hardware. This equipment consisted of 20 independent decoding channels which effectively reversed the process of ADPCM.

The Touch-Tone decoding equipment consisted of 20 independent decoding channels and performed the function of decoding the Touch-Tone inputs and routing the resultant signals to the PDP 11/34. The 20-channel system uses 10 Bell Telephone Company 407C modems and a 20-channel multiplexer to multiplex these channels into one computer input channel.

For redundancy, a second PDP 11/34 was available at TSC. In the event of a PDP 11/70 failure, the weather data base was buffered at WMSC for a limited period of time.

APPENDIX B

DATA REDUCTION

COLUMBUS FSS BEFORE STUDY — DATA REDUCTION — TOTAL PAGE

LOCAL TIME (FROM-TO) / HOUR OF THE STUDY		06/07 1	07/08 2	08/09 3	09/10 4	10/11 5	11/12 6	12/13 7	13/14 8	14/15 9	15/16 10	16/17 11	17/18 12	TOTAL
43	TOTAL CALLS IN WAIT QUEUE	42	68	76	68	73	67	85	68	39	29	57	55	727
44	TOT TIME OF CALLS IN WAIT Q	106	119	240	139	156	103	144	166	73	57	142	50	1495
45	MITRE - VRS USERS	0	0	10	0	0	0	0	0	0	0	0	0	10
47	MITRE - MAX. SIMUL. USERS	0	0	0	0	0	0	0	0	0	0	0	0	0
48	ALL TRUNKS BUSY TIME (MIN.)	0	0	0	0	0	0	0	0	0	0	0	0	0
96	PATWAS	47	84	97	102	86	83	77	62	63	73	56	33	863
40	LOST CALLS	10	13	24	20	18	26	13	19	7	11	4	8	173
SPECIALISTS AVAILABLE		2.74	2.94	3.40	3.57	2.97	2.97	3.09	3.26	3.24	3.23	2.93	2.76	3.09

LINE DATA FIGURES

LINE	HOUR 1		HOUR 2		HOUR 3		HOUR 4		HOUR 5		HOUR 6		HOUR 7		HOUR 8		HOUR 9		HOUR 10		HOUR 11		HOUR 12	
1	48	208	70	282	63	258	68	196	58	197	65	264	50	187	67	206	65	172	62	143	71	181	56	136
2	6	26	11	42	4	23	8	39	10	26	1	5	7	13	8	17	2	3	0	0	8	20	6	6
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	49	9	35	48	156	33	125	33	121	43	125	33	108	25	71	8	16	9	20	0	1	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	55	232	71	279	75	256	94	219	58	208	63	226	67	196	56	147	62	176	52	146	57	181	49	138
ALL	115	515	161	638	190	693	203	579	159	552	172	560	172	504	156	441	137	367	123	309	136	383	111	280

	06/07	07/08	08/09	09/10	10/11	11/12
AVG. LENGTH - CALL	4.47826	3.96273	3.64737	2.85222	3.47170	3.23581

	12/13	13/14	14/15	15/16	16/17	17/18	
AVG. LENGTH - CALL	2.93023	2.82692	2.67883	2.51220	2.81618	2.52252	3.17221

TOTAL OF ALL LINES 1835 CALLS IN 5821 MINUTES AVG CALL = 3.17221 MINUTES

80-50-B-1A

B-1

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 1 of 3)

COLUMBUS FSS BEFORE STUDY — DATA REDUCTION — TOTAL PAGE

LENGTH OF CALLS:

LOCAL TIME (FROM-TO) / HOUR OF THE STUDY		06/07 1	07/08 2	08/09 3	09/10 4	10/11 5	11/12 6	12/13 7	13/14 8	14/15 9	15/16 10	16/17 11	17/18 12	TOTAL	
73	(0.0-0.5 MIN.)	2	6	5	11	8	10	4	14	10	5	31	9	115	6%
74	(0.5-1.0 MIN.)	3	4	10	24	11	14	16	15	15	18	12	12	154	8%
75	(1.0-1.5 MIN.)	10	15	15	30	20	23	24	32	22	19	23	17	250	13%
76	(1.5-2.0 MIN.)	7	9	22	25	27	15	26	22	16	22	19	22	232	12%
77	(2.0-2.5 MIN.)	15	22	14	23	9	15	23	13	22	21	13	10	200	10%
78	(2.5-3.0 MIN.)	7	17	23	22	13	17	15	13	10	8	12	10	167	8%
79	(3.0-3.5 MIN.)	8	16	22	16	11	10	12	9	9	5	10	5	133	7%
81	(3.5-4.0 MIN.)	9	11	13	6	12	14	14	6	8	8	5	9	115	6%
82	(4.0-4.5 MIN.)	6	11	7	5	7	10	3	3	5	5	6	3	71	3%
83	(4.5-5.0 MIN.)	9	12	13	4	8	14	37	6	4	4	5	6	122	6%
84	(5.0-5.5 MIN.)	5	8	6	6	9	7	8	4	2	3	2	0	60	3%
85	(5.5-6.0 MIN.)	5	4	11	4	5	5	3	2	3	2	13	1	58	3%
86	(6.0-6.5 MIN.)	3	3	6	8	4	2	6	3	4	2	4	5	50	2%
87	(6.5-7.0 MIN.)	4	1	5	4	2	0	2	3	1	0	0	1	23	1%
89	(7.0-7.5 MIN.)	1	3	1	0	4	3	1	1	2	1	3	0	20	1%
90	(7.5-8.0 MIN.)	3	2	2	3	2	2	2	3	3	0	1	0	23	1%
91	(8.0-8.5 MIN.)	4	1	6	0	1	3	0	3	0	0	1	2	21	1%
92	(8.5-9.0 MIN.)	0	3	4	3	1	0	1	1	2	1	0	1	17	
93	(9.0-9.5 MIN.)	2	1	1	1	0	3	0	1	0	2	0	0	11	
94	(9.5-10.0 MIN.)	0	2	0	2	1	0	0	0	1	0	0	0	6	
95	(OVER 10 MINS.)	10	8	5	3	7	4	2	3	2	2	4	0	50	2%
	TOTAL CALLS	113	159	191	200	162	171	199	157	141	128	164	113	1898	

80-50-B-1B

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 2 of 3)

COLUMBUS FSS BEFORE STUDY DATA REDUCTION TOTAL PAGE

QUEUING CHARACTERISTICS

LOCAL TIME (FROM-TO)	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	TOTAL
HOUR OF THE STUDY	1	2	3	4	5	6	7	8	9	10	11	12	
SPECIALISTS AVAILABLE	2.74	2.94	3.40	3.57	2.97	2.97	3.09	3.26	3.24	3.23	2.93	2.76	3.09
	06/07		07/08		08/09		09/10		10/11		11/12		
AVG. LENGTH - CALL	4.47826		3.96273		3.64737		2.85222		3.47170		3.25581		
	12/13		13/14		14/15		15/16		16/17		17/18		
AVG. LENGTH - CALL	2.93023		2.82692		2.67883		2.51220		2.81618		2.52252		3.17221
	06/07		07/08		08/09		09/10		10/11		11/12		
STANDARD DEVIATION	1.74319		7.37918		5.55116		4.97176		1.02938		0.56288		
SIGMA/AVERAGE CALL LENGTH	0.38926		1.86214		1.52196		1.74312		0.29651		0.17289		
	12/13		13/14		14/15		15/16		16/17		17/18		
STANDARD DEVIATION	0.43383		0.64911		0.93833		0.37333		0.55867		0.58899		3.29405
SIGMA/AVERAGE CALL LENGTH	0.14805		0.22962		0.35028		0.14861		0.19838		0.23349		1.03841
	06/07		07/08		08/09		09/10		10/11		11/12		
SYSTEM UTILIZATION	0.53646		0.61942		0.58235		0.46320		0.53077		0.53846		
	12/13		13/14		14/15		15/16		16/17		17/18		
SYSTEM UTILIZATION	0.46667		0.38684		0.32335		0.27345		0.37366		0.29016		0.44829
	06/07		07/08		08/09		09/10		10/11		11/12		
PROBABILITY OF BUSY SYSTEM	0.30239		0.38536		0.30544		0.16513		0.27365		0.28247		
	12/13		13/14		14/15		15/16		16/17		17/18		
PROBABILITY OF BUSY SYSTEM	0.19726		0.11793		0.07529		0.04905		0.12593		0.08047		0.17918

80-50-B-1C

FIGURE B-1. COLUMBUS FSS BEFORE STUDY (Sheet 3 of 3)

COLUMBUS FSS AFTER STUDY DATA REDUCTION TOTAL PAGE

LOCAL TIME (FROM-TO) / HOUR OF THE STUDY		06/07 1	07/08 2	08/09 3	09/10 4	10/11 5	11/12 6	12/13 7	13/14 8	14/15 9	15/16 10	16/17 11	17/18 12	TOTAL
43	TOTAL CALLS IN WAIT QUEUE	64	36	54	65	46	56	62	50	53	36	30	16	568
44	TOT TIME OF CALLS IN WAIT Q	169	108	115	163	85	78	120	70	81	49	68	25	1131
45	MITRE - VRS USERS	44	53	59	65	63	81	86	72	83	65	67	81	819
47	MITRE - MAX. SIMUL. USERS	6	10	12	11	12	13	17	13	15	14	19	20	162
48	ALL TRUNKS BUSY TIME (MIN.)	0	0	0	0	0	0	0	0	0	0	0	0	0
96	PATWAS	27	61	72	87	73	89	49	78	71	66	55	26	754
40	LOST CALLS	15	14	15	25	12	14	11	10	10	10	7	2	145
SPECIALISTS AVAILABLE		2.07	2.07	2.18	2.17	2.20	2.21	2.21	2.03	2.01	2.01	2.00	2.01	2.10

LINE DATA FIGURES

LINE	HOUR 1		HOUR 2		HOUR 3		HOUR 4		HOUR 5		HOUR 6		HOUR 7		HOUR 8		HOUR 9		HOUR 10		HOUR 11		HOUR 12	
1	49	215	54	228	84	225	74	206	75	207	55	164	79	218	73	175	76	183	61	153	50	141	51	118
2	12	40	15	76	6	15	6	14	11	36	11	23	11	27	8	18	2	4	2	6	0	0	1	0
3	0	0	0	0	3	6	5	26	3	16	4	10	2	6	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
5	43	185	54	236	69	217	65	211	64	163	72	195	62	189	86	185	81	173	67	161	50	141	45	101
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALL	104	440	123	540	162	463	150	457	153	422	142	392	155	442	167	378	159	360	130	320	100	282	97	219

	06/07	07/08	08/09	09/10	10/11	11/12
AVG. LENGTH - CALL	4.23077	4.39024	2.85802	3.64667	2.75817	2.76056

	12/13	13/14	14/15	15/16	16/17	17/18	
AVG. LENGTH - CALL	2.85161	2.26347	2.26415	2.46154	2.82000	2.25773	2.87150

TOTAL OF ALL LINES 1642 CALLS IN 4715 MINUTES AVG CALL = 2.87150 MINUTES

80-50-B-2A

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 1 of 4)

COLUMBUS FSS AFTER STUDY — DATA REDUCTION — TOTAL PAGE

LENGTH OF CALLS:

LOCAL TIME (FROM-TO) / HOUR OF THE STUDY		06/07 1	07/08 2	08/09 3	09/10 4	10/11 5	11/12 6	12/13 7	13/14 8	14/15 9	15/16 10	16/17 11	17/18 12	TOTAL	
73	(0.0-0.5 MIN.)	2	4	12	5	8	5	8	13	16	11	8	7	99	5%
74	(0.5-1.0 MIN.)	3	2	14	11	13	13	15	22	17	14	14	16	154	9%
75	(1.0-1.5 MIN.)	8	10	14	24	13	20	18	21	27	21	17	15	208	12%
76	(1.5-2.0 MIN.)	13	5	20	26	27	19	24	29	25	20	11	12	231	13%
77	(2.0-2.5 MIN.)	6	14	15	14	19	18	22	29	19	19	9	15	199	11%
78	(2.5-3.0 MIN.)	8	18	12	16	23	9	11	23	13	12	2	11	158	9%
79	(3.0-3.5 MIN.)	10	7	17	11	17	12	9	3	16	8	12	4	126	7%
81	(3.5-4.0 MIN.)	6	13	14	10	8	7	18	5	12	4	5	6	110	6%
82	(4.0-4.5 MIN.)	6	7	9	6	9	10	4	5	3	1	3	2	65	3%
83	(4.5-5.0 MIN.)	10	9	6	4	4	11	6	6	1	3	2	2	64	3%
84	(5.0-5.5 MIN.)	6	6	9	6	2	4	2	3	5	4	2	2	51	3%
85	(5.5-6.0 MIN.)	7	8	3	8	2	1	3	5	0	2	1	1	41	2%
86	(6.0-6.5 MIN.)	9	7	4	3	4	0	6	1	2	1	4	1	42	2%
87	(6.5-7.0 MIN.)	2	3	1	7	0	3	1	0	1	3	1	0	22	1%
89	(7.0-7.5 MIN.)	5	1	0	1	0	1	1	0	1	1	1	0	12	
90	(7.5-8.0 MIN.)	0	4	1	2	0	0	0	0	0	2	0	1	10	
91	(8.0-8.5 MIN.)	3	2	2	0	1	0	0	0	0	1	1	1	11	
92	(8.5-9.0 MIN.)	3	3	1	2	1	2	0	1	1	1	1	1	17	1%
93	(9.0-9.5 MIN.)	3	1	0	1	0	0	0	1	0	0	0	1	7	
94	(9.5-10.0 MIN.)	1	0	2	0	1	0	2	0	0	0	0	0	6	
95	(OVER 10 MINS.)	3	5	0	1	2	2	5	1	1	2	4	0	26	1%
	TOTAL CALLS	114	131	156	158	154	140	155	168	160	130	98	98	1662	

80-50-B-2B

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 2 of 4)

COLUMBUS FSS AFTER STUDY DATA REDUCTION TOTAL PAGE

QUEUING CHARACTERISTICS

LOCAL TIME (FROM-TO) HOUR OF THE STUDY	06/07 1	07/08 2	08/09 3	09/10 4	10/11 5	11/12 6	12/13 7	13/14 8	14/15 9	15/16 10	16/17 11	17/18 12	TOTAL
SPECIALISTS AVAILABLE	2.07	2.07	2.18	2.17	2.20	2.21	2.21	2.03	2.01	2.01	2.00	2.01	2.10
	06/07		07/08		08/09		09/10		10/11		11/12		
AVG. LENGTH - CALL	4.23077		4.39024		2.85802		3.04667		2.75817		2.76056		
	12/13		13/14		14/15		15/16		16/17		17/18		
AVG. LENGTH - CALL	2.85161		2.26347		2.26415		2.46154		2.82000		2.25773		2.87150
	06/07		07/08		08/09		09/10		10/11		11/12		
STANDARD DEVIATION	*********		*********		*********		*********		*********		0.68594		
SIGMA/AVERAGE CALL LENGTH	********		********		********		********		********		0.24848		
	12/13		13/14		14/15		15/16		16/17		17/18		
STANDARD DEVIATION	1.19948		0.91793		1.06923		1.00402		1.30948		0.77080		*********
SIGMA/AVERAGE CALL LENGTH	0.42063		0.40554		0.47224		0.40788		0.46435		0.34140		********
	06/07		07/08		08/09		09/10		10/11		11/12		
SYSTEM UTILIZATION	0.60815		0.74483		0.60761		0.60132		0.54876		0.50679		
	12/13		13/14		14/15		15/16		16/17		17/18		
SYSTEM UTILIZATION	0.57032		0.53090		0.51100		0.45455		0.40286		0.31174		0.53513
	06/07		07/08		08/09		09/10		10/11		11/12		
PROBABILITY OF BUSY SYSTEM	0.45361		0.63046		0.44252		0.43529		0.36973		0.32059		
	12/13		13/14		14/15		15/16		16/17		17/18		
PROBABILITY OF BUSY SYSTEM	0.39335		0.36489		0.34438		0.28302		0.23138		0.14767		0.36356

80-50-B-2C

FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 3 of 4)

'VRS USERS THAT CALLED COLUMBUS FSS TOTAL PAGE

124 VALUES WERE READ.	
THE SUM OF THE VALUES IS....	266.94995
THE MEDIAN VALUE IS.....	1.78000
THE MEAN VALUE IS.....	2.15282
THE VARIANCE S**2 IS.....	4.95415
THE STANDARD DEVIATION IS...	2.22579

CLASS BOUNDARIES	FREQ
0.10 - 0.60	9
0.60 - 1.10	21
1.10 - 1.60	25
1.60 - 2.10	18
2.10 - 2.60	18
2.60 - 3.10	8
3.10 - 3.60	8
3.60 - 4.10	6
4.10 - 4.60	1
4.60 - 5.10	1
5.10 - 5.60	4
5.60 - 6.10	1
6.10 - 6.60	1
6.60 - 7.10	2
7.10 - 7.60	0
7.60 - 8.10	0
8.10 - 8.60	0
8.60 - 9.10	0
9.10 - 9.60	0
9.60 - 10.10	1

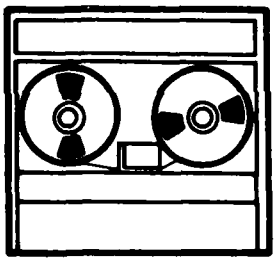
80-50-B-2D

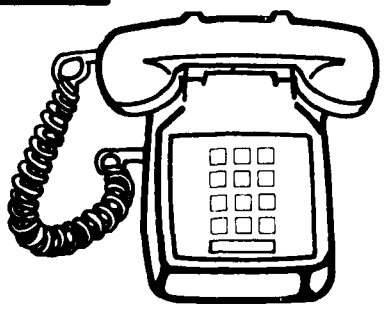
FIGURE B-2. COLUMBUS FSS AFTER STUDY (Sheet 4 of 4)

APPENDIX C

THE VOICE RESPONSE SYSTEM USER INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION





To obtain actual weather information for pre-flight planning, dial the designated number for your local area.

Select Surface Observations, Terminal Forecasts, and Forecast Winds Aloft for specific locations along your route of flight. A computer voice provides the information; and any push-button telephone can be used. For a complete weather briefing, please contact your Flight Service Station.

FAA is testing this system as part of a wide-ranging program to improve and automate weather briefings for general aviation pilots. Comments about the Voice Response System should be mailed to:

VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City
New Jersey 08405

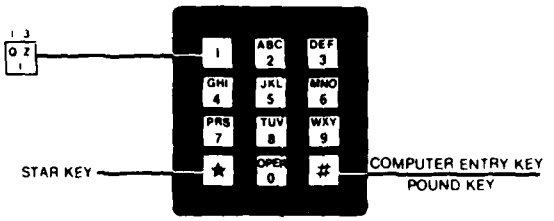
Columbus, Ohio Area System Access dial:

Columbus	(614) 461-1659
Lancaster	(614) 654-5457
Marion	(614) 382-1777
Mansfield	(614) 525-2955
Newark	(614) 345-1493

Note: At press time the above listed numbers were correct; however, pilots experiencing difficulty accessing the VRS should contact the Columbus FSS to confirm validity.

FIGURE C-1. BROCHURE: VOICE RESPONSE

VOICE RESPONSE SYSTEM



OPERATING PROCEDURES

Any public, business, or home telephone with a standard 12-key signalling system will be used to access the system. The conventional rotary dial telephone may be utilized only for dialing the access numbers, but an acoustically-coupled tone signalling device, in lieu of a TOUCHTONE® telephone, must be employed in conjunction with the rotary dial telephone to enter the information requests. Acoustically-coupled tone signalling devices (with 12- or 16-key data entry device) are generally available from electronics supply houses at low costs or can be leased from your local telephone company.

Initially, you access the Voice Response System by dialing a local access number. This will be a toll free call when initiated in one of the test locations; otherwise, it is a toll call to your closest VRS.

To communicate with the computer you must use the keypad in a way that the computer "understands."

Locations (weather reporting stations and airports) are uniquely identified by three-letter combinations and you enter these three letter identifiers to delineate a single location or a series of locations (e.g., a proposed flight path) for which you desire to know the weather.

The keypad does not have enough keys to allow the entry of an alphabetic character (letter) with a single keystroke. But it is possible to make an unambiguous entry by depressing two keys. You can enter a particular letter by depressing the key on which that letter appears and another key to indicate which of the three letters, 1st, 2nd, or 3rd. The numeral "1" key indicates the first letter, the numeral "2" key indicates the 2nd, and the numeral "3" key indicates the 3rd. Thus the letter B is signalled by depressing the key on which B appears (the number "2" key) and then the numeral "2" key (2nd letter in the group, ABC).

The letter C is signalled by depressing the key on which "C" appears and the numeral "3" key (3rd letter in group ABC).

The letters Q and Z and the blank character are assigned to the numeral "1" key. Q is 1—1, 'blank' is 1—2, and Z is 1—3. Each of the twenty-six letters of the alphabet can be entered in this fashion (two keystrokes) and no confusion will result. The 'blank' is not used.

But it does not suffice just to be able to communicate a string of letters of the alphabet to the computer. You must be able to tell the computer what you want done with the information you have provided. At the lower right-hand corner of the keypad, there is a key imprinted with a "#" symbol. We call this the 'computer entry' key or, for conciseness, the 'pound' key. Since this key is not used to transmit letters or numbers, it creates no confusion to employ it as a control key to signal an action or a request. Used in conjunction with other keys, a number of different actions can be signalled. Other control functions will be explained later.

The computer must be able to recognize the end of an entry (i.e., a string of alphabetic, numeric or mixed characters) and the request that it respond. The computer entry key ('#'/or 'pound' key) is depressed twice to provide the end-of-entry signal immediately following each and every field. Thus, to request weather data for Martinsburg, W. Va. (and vicinity), you generate the keystroke sequence 'M—1', 'R—2', 'B—2', '#', '#.

Some location identifiers use both letter and numerals. For these entries, it is necessary to utilize two keystrokes for each letter or numeral. The context of the pilot—computer dialogue will often preclude ambiguities and permit simpler data entry. Numbers can be entered unambiguously by

depressing the 'OPER' key and the appropriate numeral key. The 'OPER' key is the key representing the numeral 'Ø' (or zero) so that entry of the numeral 'Ø' involves two actuations of the 'OPER' key. The numeral '5' is communicated by depressing 'OPER' and '5' and the other numerals are similarly communicated.

The procedure described is used only for entering numbers in three-letter location identifiers with mixed letters and numbers. For all other numeric entries, single keystrokes for numbers are required. For example, if the computer 'voice' requests an altitude or a number of hours (from the present time), then the numeric entries for these fields may be made via a single keystroke for each digit of the entry.

You will seldom, if ever, be confused in practice and you will find that most of the numerical entries you need to make will require only a single key actuation per digit. In the uncommon case where you wish to enter an identifier such as 6B2 (Greenville, Maine), you will probably experience no difficulty in recognizing that the keystroke sequence should be Ø—6, B—2, Ø—2, '#', '#'.

The computer will 'read back' each item entered so that you may verify the correctness of your entry. The phonetic alphabet will generally be used so that the identifier MIV will be read back as "MIKE" "INDIA" "VICTOR"; CHO will be read back as "CHARLIE" "HOTEL" "OSCAR". For some locations, the actual name of the airport will be read back to determine the mode of response preferred by pilots. For example, DCA (Washington National Airport) will be read back as "Washington National."

CONTROL FUNCTIONS:

The use of the '#' (pound) key was discussed previously. The '☆' (STAR) key is used to stop the computer response. While in the response mode, if you wish to interrupt the computer voice response, simply depress the '☆' key. You can halt the voice response until you are ready to proceed. After stopping the response, you may then order a resumption of voice response, a repeat, a jump ahead (skip), or a begin over, by selecting the appropriate keystroke sequence shown below. Notice that the **enter command '#'—'#' is not required after the control functions containing the '☆' (STAR) keystroke.**

ENTER	#	#		REPEAT	☆	R
YES(Y)	Y	#	#	JUMP AHEAD	☆	J
NO(N)	N	#	#	DELETE	☆	D
STOP	☆			BEGIN OVER	☆	B
GO	☆	G				

Notice that "YES" or "NO" only requires three keystrokes "Y" '#' '#' or "N" '#' '#'.

AN EXAMPLE OF A TYPICAL VRS DIALOGUE:

Now that we have explained the procedures necessary to obtain access to the weather briefing, let's follow a pilot through a typical briefing.

Initially, you access the Voice Response System by dialing or keying the published number.

PILOT— pilot dials xxx-xxxx
SYSTEM— "HELLO", "Current Greenwich Time is XXXX."
SYSTEM— "Enter Location Identifier."
PILOT— (Desired location — PIT) P—1; I—3; T—1; # #
SYSTEM— "PAPA", "INDIA", "TANGO" "ENTER NEXT LOCATION"
PILOT— (Desired location — ILG) I—3; L—3; G—1; # #
SYSTEM— "INDIA", "LIMA", GOLF" "ENTER NEXT LOCATION"
PILOT— (If no additional entries, enter # #)
SYSTEM— "Do you want hourly surface observations? Answer yes or no."
PILOT— Y; # #
SYSTEM— reads hourlys for PIT, ILG, etc.
SYSTEM— "Do you want terminal forecasts? Answer yes or no."
PILOT— Y; # #
SYSTEM— reads forecasts for PIT and ILG
SYSTEM— "Do you want forecast winds aloft? Answer yes or no."
PILOT— Y; # #
SYSTEM— "How many hours from now? The maximum is 30."
PILOT— 6; # #
SYSTEM— "six"

FIGURE C-1. BROCHURE: VOICE

SYSTEM— "At what altitude?"
PILOT— 85; (or 8500; no matter) # #
SYSTEM— "eight five"
SYSTEM— reads winds aloft at requested altitude, + 4000 feet and − 4000 feet for each location.
SYSTEM— "Do you want more information? Answer yes or no."
PILOT— Y; # #
SYSTEM— "Enter location identifier, etc."

DATA NOT AVAILABLE

When data are not available, one of the following will occur:

1. Wrong Identifier: If a three-character entry which does not constitute a valid location identifier is made (e.g., ABC), the VRS will read back the characters as entered. However, when the report requested is to read out, the VRS will say "ALPHA—BRAVO—CHARLIE . . . is not a location identifier."
2. No Report for a Given Location: If the location identifier is a valid one but not a reporting station for the type of report requested, the VRS will say "ALPHA—BRAVO—CHARLIE . . . is not an Hourly Observation Station" or ". . . is not a terminal forecast location."
3. Noncurrent Data: If the location identifier is a valid one but the current data are not available, the VRS will say (e.g., SBY), "SIERRA—BRAVO—YANKEE . . . report not available" for report type requested.

NOTE: 1. HOURLY OBSERVATIONS: Only the latest available observation will be given provided that the observation is not more than 2 hours old. Special observations will be appended to last hourly.

2. All reporting stations for weather observations within the continental United States are contained in the data base.

3. Minimum altitude for forecasted winds aloft is approximately 2,000 feet above terrain level.

4. The system has some time-out functions which limit the amount of time an individual can use the system. This feature has been incorporated to preclude an individual from tying up the phone lines for an extended period.

LOCATION IDENTIFIERS

Weather information from these airports and weather reporting stations is available to the pilot through the FAA telephone voice response system.

* TERMINAL FORECAST LOCATIONS

ALABAMA

*ANB	Anniston
*BHM	Birmingham
*DHN	Dothan
GAD	Gadsden
*HSV	Huntsville
*MOB	Mobile
*MGM	Montgomery/ Dannelley Field
MXF	Montgomery/ Maxwell AFB
*MSL	Muscle Shoals
OZR	Ozark Ft. Rucker AAF
SEM	Selma
*TCL	Tuscaloosa

ARIZONA

CHD	Chandler-Williams AFB
*DUG	Douglas
*FLG	Flagstaff
FHU	Ft. Hauchuca/Sierra Vista-Libby AAF
GBN	Gila Bend AF AUX
LUF	Glendale/ Luke Field AFB
GCN	Grand Canyon
JBR	Jonesboro
IGM	Kingman
PGA	Page
*PHX	Phoenix
*PRC	Prescott
SAD	Safford
DMA	Tucson/Davis Monthan AFB
*TUS	Tucson
*INW	Winslow
*YUM	Yuma

ARKANSAS

BYH	Blytheville AFB
*ELD	El Dorado
*FYV	Fayetteville
*FSM	Fort Smith
*HRO	Harrison
*HOT	Hot Springs
LRF	Jacksonville/Little Rock AFB
*LIT	Little Rock
*PBF	Pine Bluff
*TXK	Texarkana
ARG	Walnut Ridge
AWM	West Memphis

CALIFORNIA

NGZ	Alameda NAS
*ACV	Arcata
AVX	Avalon Catalina Island
*BFL	Bakersfield
BUO	Beaumont
*BIH	Bishop
BLU	Blue Canyon
*BLH	Blythe
*BUR	Burbank
BNY	Burney
CZZ	Campo
CRG	Carlsbad
CIC	Chico
CCR	Concord
*CEC	Crescent City
NRC	Crows Landing NAF
*DAG	Daggett
EDW	Edwards AFB
SUU	Fairfield/Travis AFB
*FAT	Fresno
FUL	Fullerton
HHR	Hawthorne
HWD	Hayward
*IPL	Imperial
NRS	Imperial Beach OLF
NID	Inyokern NAS
*WJF	Lancaster
NLC	Lemoore NAS
VVG	Lompoc/ Vandenberg AFB

80-50-A-1B

*LGB Long Beach
NTB Los Alamitos NAS
*LAX Los Angeles Int'l
*VNY Los Angeles Van Nuys
BAB Marysville Beale AFB
MYV Marysville Yuba County
MER Merced Castle AFB
MOD Modesto
SIY Montague
OAR Monterey Fort Ord AAF
*MRY Monterey Peninsula
MHS Mount Shasta
MWS Mount Wilson
NUQ Mountain View Moffett NAS
APC Napa
*EED Needles
*OAK Oakland
*ONT Ontario Int'l
OXR Oxnard
*PSP Palm Springs
*PMD Palmdale AF Plant 42
*PRB Paso Robles
NTD Point Mugu NAS
*RBL Red Bluff
*RDD Redding
RIV Riverside March AFB
MHR Sacramento Mather AFB
MCC Sacramento McClellan AFB
*SAC Sacramento Executive
*SMF Sacramento Metro
*SNS Salinas
SJT San Angelo
SBD San Bernardino Norton AFB
NUC San Clemente Island NALF
NZY San Diego Halsey Field, North Island
NKX San Diego Mitscher Field, Miramar NAS
*SAN San Diego Int'l Lindbergh Field
SEE San Diego Santee Gillespie
*SFO San Francisco
*SJC San Jose
NSI San Nicolas Island
SRF San Rafael Hamilton Field
SDB Sandberg
NZJ Santa Ana El Toro MCAS
*SNA Santa Ana Orange County
*SBA Santa Barbara
SXC Santa Catalina Island
SZN Santo Cruz Island
*SMX Santa Maria
SMO Santa Monica
*STS Santa Rosa
*TVL South Lake Tahoe
*SCK Stockton
SVE Susanville
TRM Thermal
TOA Torrance
*UKI Ukiah
VCV Victorville George AFB
VIS Visalia
L22 Yucca Valley

COLORADO

AKO Akron
*ALS Alamosa
*ASE Aspen
*COS Colorado Springs Muni
CEZ Cortez
BKF Denver Buckley ANGB
*DEN Denver Stapleton Int'l
DRO Durango
*EGE Eagle
FCS Fort Carson Butts AAF
FCL Fort Collins
*GJT Grand Junction
GUC Gunnison
2V9 Gunnison Weather Reporting Station
HDN Hayden
4LJ Lamar
LHX La Jun...
LXV Leadville
LIC Limon
MTJ Montrose
*PUB Pueblo
STK Sterling
TAD Trinidad

CONNECTICUT

*BDR Bridgeport
DXR Danbury
GON Gordon New London
HFD Hartford
HVN New Haven
7B8 New London
*BDL Windsor-Locks

DELAWARE

DOV Dover AFB
*ILG Wilmington

DISTRICT OF COLUMBIA

*IAD Washington Dulles
*DCA Washington National

FLORIDA

AQQ Apalachicola
AGR Avon Park Aux.
BOW Bartow
X53 Clewiston
COF Cocoa
CEW Crestview
CTY Cross City
*DAB Daytona Beach
*FLL Ft. Lauderdale
*FMY Ft. Myers
*GNV Gainesville
HST Homestead AFB
NZC Jacksonville/Cecil Field NAS
*JAX Jacksonville Int'l
NIP Jacksonville/NAS Towers Field
*EYW Key West
HRT Mary Esther
NRB Mayport NAS
*MLB Melbourne
*MIA Miami Int'l
NSE Milton/NAS Whiting
ORL Orlando/Herndon
*MCO Orlando Int'l
*PFN Panama City/Bay County
PAM Panama City/Tyndall AFB
NPA Pensacola/Sherman NAS
*PNS Pensacola Regional
SFB Sanford
SRQ Sarasota/Bradenton
PIE St. Petersburg/Clearwater
*TLH Tallahassee
MCF Tampa/MacDill AFB
*TPA Tampa Int'l
VPS Valparaiso/Eglin AFB
*VRB Vero Beach
*PBI West Palm Beach

GEORGIA

*ABY Albany
AMG Alma
*AHN Athens
FTY Atlanta/Charlie Brown County
*ATL Atlanta/Hartsfield Int'l
*AGS Augusta
*SSI Brunswick
*CSG Columbus
LSF Ft. Benning AAF
LHW Hinesville
LGC La Grange
*MCN Macon/Wilson
WRB Macon/Warner Robins AFB
MGE Marietta AFB
MGR Moultrie
7A9 Plains
RMG Rome
*SAV Savannah
VAD Valdosta/Moody AFB
*VLD Valdosta Muni

IDAHO

*BOI Boise
*BYI Burley
GNG Gooding
S80 Grangeville
SUN Hailey
*IDA Idaho Falls
*LWS Lewiston
MLD Malad City
MUO Mountain Home AFB
*PIH Pocatello
SMN Salmon
*TWF Twin Falls

ILLINOIS

ALN Alton
BLV Belleville/Scott AFB
BMI Bloomington/Normal
BDF Bradford
MDH Carbondale/Murphysboro
*CMI Champaign/Urbana
*MDW Chicago/Midway
CGX Chicago/Merrill C. Meigs
*ORD Chicago/O'Hare Int'l
*DPA Chicago
DNV Danville
*DEC Decatur
CPS East St. Louis
NBU Glenview NAS
MWA Marion
MTO Mattoon/Charleston
*MLI Moline
MYN Mt. Vernon
*PIA Peoria
*UIN Quincy
*RFD Rockford
*SPI Springfield
VLA Van Dalia

INDIANA

BMG Bloomington
*EVV Evansville
*FWA Ft. Wayne
*IND Indianapolis
*LAF Lafayette
*MIE Muncie
GUS Peru
*SBN South Bend
*HUF Terre Haute

IOWA

*CID Cedar Rapids
*BRL Burlington
*DSM Des Moines
*DBQ Dubuque
FOD Ft. Dodge
3I1 Lamoni
MEY Mapleton
*MCW Mason City
*OTM Ottumwa
*SUX Sioux City
3SE Spencer
*ALO Waterloo

KAN
*CN
CN
*DD
IKS
EM
FRI
*GC
*GL
GB
HLC
*HUT
FLV
LBL
MH
OJC
RSL
*SLN
FOE
*TOP
IAB
*ICT
KENT
*BWG
FTK
HOP
*LEX
*LOZ
LOU
*SDF
*OWB
*PAH
LOU
AEX
*ESF
*BTR
BVE
HUM
7R4
*LFT
*LCH
POE
*MLU
NBG
NEW
*MSY
BAD
*SHV
MAIN
*AUG
*BGR

FIGURE C-1. BROCHURE: VOICE RESPO

KANSAS

*CNU Chanute
CNK Concordia
*DDC Dodge City
IK5 Elkhart
EMP Emporia
FRI Ft. Riley Marshall AAF
*GCK Garden City
*GLD Goodland
GBD Great Bend
HLC Hill City
*HUT Hutchinson
FLV Leavenworth Sherman AAF
LBL Liberal
MHK Manhattan
OJC Olathe
RSL Russell
*SLN Salina
FOE Topeka Forber Field
*TOP Topeka Philip Billard Muni
IAB Wichita McConnell AFB
*ICT Wichita Mid-Continent

KENTUCKY

*BWG Bowling Green
FTK Ft. Knox Goodman AAF
HOP Hopkinsville Campbell AAF
*LEX Lexington
*LOZ London
LOU Louisville Bowman
*SDF Louisville Standiford
*OWB Owensboro
*PAH Paducah

LOUISIANA

AEX Alexandria England AFB
*ESF Alexandria Esler Regional
*BTR Baton Rouge
BVE Boothville
HUM Houma
7R4 Intracoastal City
*LFT Lafayette
*LCH Lake Charles
POE Leesville Fort Polk AAF
*MLU Monroe
NBG New Orleans Alvin Callendar NAS
NEW New Orleans Lakefront
*MSY New Orleans Int'l
BAD Shreveport Barksdale AFB
*SHV Shreveport Regional

MAINE

*AUG Augusta
*BGR Bangor
BHB Bar Harbor
NHZ Brunswick NAS
*CAR Caribou
6B2 Greenville
HUL Houlton
LIZ Limestone
MLT Millinocket
75B Mount Vernon
OLD Old Town
*PWM Portland
PQI Presque Isle
HKD Rockland

MARYLAND

*BWI Baltimore-Washington Int'l
MTN Baltimore Glenn L. Martin
ADW Camp Springs Andrews AFB
FME Ft. Meade Tipton AAF
HGR Hagerstown
NHK Patuxent River NAS
*SBY Salisbury

MASSACHUSETTS

BED Bedford
BVY Beverly
*BOS Boston
CEF Chicopee Falls
GTR Columbus
FMH Falmouth Otis AFB
HYA Hyannis
MVY Marthas Vineyard
*ACK Nantucket
EWB New Bedford
OWD Norwood
OLV Olive Branch
PSF Pittsfield
NZW South Weymouth NAS
*BAF Westfield
*ORH Worcester

MICHIGAN

*APN Alpena
ARB Ann Arbor
*BTL Battle Creek
BEH Benton Harbor
*DET Detroit City
*PTW Detroit Metro, Wayne County
*YIP Detroit Willow Run
ESC Escanaba
*FNT Flint
*GRR Grand Rapids
SAW Gwinn Sawyer AFB
CMX Hancock
HTL Houghton Lake
IMT Iron Mountain Kingsford
IWD Ironwood
AZO Kalamazoo
*LAN Lansing
MBL Manistee
*MQT Marquette
MNM Menominee
MTC Mt. Clemens/Selfridge ANGB
*MKG Muskegon
OSC Oscoda Wurtsmith AFB
*PLN Pellston
PTK Pontiac
*MBS Saginaw
*SSM Sault Ste. Marie/County
INR Sault Ste. Marie/Kincheloe AFB
*TVC Traverse City

MINNESOTA

*AXN Alexandria
BDE Baudette
*BJI Bemidji
*BRD Brainerd
*DLH Duluth
*FRM Fairmont
*HIB Hibbing
*INL International Falls
MKT Mankato
*MSP Minneapolis
AWF Redwood Falls
*RST Rochester
STC St. Cloud
TVF Thief River Falls
OTG Worthington

MISSISSIPPI

BIX Biloxi/Keesler AFB
CBM Columbus AFB
*GLH Greenville
*GWO Greenwood
*GPT Gulfport
HBG Harrisburg
*JAN Jackson/Thompson Field
JXN Jackson County/Reynolds Field
LUL Laurel
*MCB McComb
*MEI Meridian/Key Field
NMM Meridian/McCain Field NAS
HEZ Natchez
UOX Oxford
PGL Pascagonia
TUP Tupelo
VKS Vicksburg

MISSOURI

*CGI Cape Girardeau
*COU Columbia
TBN Ft. Leonard Wood/Forney AAF
GVW Grandview/Richards Gebaur AFB
JEF Jefferson City
*JLN Joplin
*MKC Kansas City/Downtown
*MCI Kansas City Int'l
JRK Kirksville
SZL Knob Noster/Whiteman AFB
VIH Rolla/Richy
*STL St. Louis/Lambert-St. Louis Int'l
SUS St. Louis/Spirit of St. Louis
*STJ St. Joseph
*SGF Springfield

MONTANA

*BIL Billings
*BZN Bozeman
4BQ Broadus
*BTM Butte
*CTB Cut Bank
DLN Dillon
3DU Drummond
*GGW Glasgow
GDV Glendive
*GTF Great Falls Int'l
GFA Great Falls/Malstrom AFB
3HT Harlowton
*HVR Harve
*HLN Helena
*FCA Kalispell/Glacier Int'l
*LWT Lewistown
LVM Livingston
*MLS Miles City
*MSO Missoula/Johnson Bell
MQM Monida
SDY Sidney
3TH Thompson Falls
WYS West Yellowstone
4HA Whitehall
OLF Wolf Point

NEBRASKA

ANW Ainsworth
AIA Alliance Muni
BIE Beatrice
BBW Broken Bow
*CDR Chadron Muni
OLU Columbus Muni
*GRI Grand Island/Hall County
HSI Hastings
IML Imperial
EAR Kearney
*LNK Lincoln
MCK McCook
MHN Mullen
*OFK Norfolk
*LBF North Platte/Lee Bird
*OMA Oma/Eppley Airfield
OFF Omaha/Offutt AFB
ONL O'Neill
*BFF Scottsbluff
SNY Sidney
VTN Valentine Miller

80-50-A-1C

E: VOICE RESPONSE SYSTEM (Sheet 3 of 4)

NEVADA

BAM Battle Mountain
*EKO Elko
*ELY Ely
NFL Fallon NAS
*LAS Las Vegas/McCarran Int'l
LSV Las Vegas/Nellis AFB
*LOL Lovelock
OWY Owyhee
*RNO Reno
*TPH Tonopah
*WMC Winnemucca
UCC Yucca Flats

NEW HAMPSHIRE

BML Berlin
*CON Concord
EEN Keene
LCI Laconia
*LEB Lebanon
MHT Manchester
MWN Mount Washington
PSM Portsmouth

NEW JERSEY

*ACY Atlantic City/NAFEC
NEL Lakehurst NAEC
*MIV Millville
MMU Morristown
*EWR Newark
TEB Teterboro
TTN Trenton
WRI Wrightstown/McGuire AFB

NEW MEXICO

HMN Alamogordo/Holland AFB
*ABQ Albuquerue
*CNM Carlsbad
CAO Clayton
CVS Clovis/Cannon AFB
4CR Corona
4SL Cuba
*DMN Deming
*FMN Farmington
*GUP Gallup
GNT Grants
*HOB Hobbs/Lea County
LRU Las Cruces/Crawford
*LVS Las Vegas
LAM Los Alamos
4MY Moriarty
RTN Raton/Crews
*ROW Roswell Industrial
RUI Ruidoso
*SAF Santa Fe
SVC Silver City/Grant
ONM Socorro
*TCS Truth or Consequences
*TCC Tucumcari
ZUN Zuni/Pueblo

NEW YORK

*ALB Albany
*BGM Binghamton/Broome
*BUF Buffalo Int'l
*ELM Elmira
FRG Farmingdale
*GLF Glens Falls
*ISP Islip
*ITH Ithaca/Tompkins County
*JHW Jamestown/Chautauqua
*MSS Massena
MSV Monticello Sullivan
*SWF Newburg Stewart
*JFK New York/John F. Kennedy Int'l
*LGA New York/La Guardia
*IAG Niagara Falls
OGS Ogdensburg
PBG Plattsburg AFB
*POU Poughkeepsie
*ROC Rochester
RME Rome/Griffiss AFB
*SLK Saranac Lake
*SYR Syracuse
*UCA Utica Oneida
*ART Watertown
FOK Westhampton Beach
*HPN White Plains

NORTH CAROLINA

*AVL Asheville
*CLT Charlotte/Douglas
NKT Cherry Point
*ECG Elizabeth City
*FAY Fayettesville Muni
FBG Fayettesville/Ft. Bragg AAF
POB Fayettesville/Pope AFB
GSB Goldsboro/Seymour Johnson AFB
*GSO Greensboro
HAT Hatteras WSO
*HKY Hickory
HSS Hot Springs
OAJ Jacksonville/Albert J. Ellis
NCA Jacksonville/New River
ISO Kinston
*EWN New Bern/Simmons Nott
*RDU Raleigh-Durham
RMT Rocky Mount Downtown
*RWI Rocky Mount-Wilson
SOP Southern Pines
*ILM Wilmington
*INT Winston-Salem

NORTH DAKOTA

*BIS Bismarck Muni.
DVL Devils Lake
*DIK Dickinson
*FAR Fargo
RDR Grand Forks AFB
*GFK Grand Forks Int'l
*JMS Jamestown
MIB Minot AFB
*MOT Minot Int'l
*ISN Williston Sloulin

OHIO

*CAK Akron/Canton
*LUK Cincinnati/Lunken
BKL Cleveland/Burke Lakefront
CGF Cleveland/Cuyahoga County
*CLE Cleveland Hopkins Int'l
OSU Columbus/Ohio State University
*CMH Columbus/Port Columbus Int'l
LCK Columbus/Rickenbacker AFB
*CVG Covington/Cincinnati
*DAY Dayton/James M. Cox Int'l
FFO Dayton/Wright-Patterson AFB
*FDY Findlay
*MFD Mansfield/Lahm Muni
SGH Springfield Muni
*TOL Toledo Express
ILN Wilmington Industrial
*YNG Youngstown Muni
*ZZV Zanesville Muni

OKLAHOMA

LTS Altus AFB
*ADM Ardmore Muni
CSM Clinton Sherman
END Enid Vance AFB
FSI Ft. Sill AAF
*GAG Gage Muni
*HBR Hobart
*MLC McAlester Muni
TIK Oklahoma City/Tinker AFB
*OKC Oklahoma City/Will Rogers World
*PNC Ponca City Muni
SWO Stillwater
*TUL Tulsa Int'l

OREGON

*AST Astoria/Clatsop
*BKE Baker
4BK Brookings
4BW Burns
CZK Cascade Locks
*LMT Klamath Falls
CVO Corvallis Muni
*EUG Eugene Sweet
HIO Hillsboro Portland
LGD La Grande
4LW Lakeview
MEH Meacham
*MFR Medford-Jackson
JNW Newport
*OTH North Bend Muni
ONO Ontario
*PDT Pendleton
*PDX Portland Int'l
*RDM Redmond Roberts Muni
RBG Roseburg Muni
*SLE Salem/McNary Field
SXT Sexton Summit
*DLS The Dalles Muni
*TTD Troutdale

PENNSYLVANIA

*ABE Allentown
BSI Blairsville
*BFD Bradford
*ERI Erie Int'l
*FKL Franklin/Lamberton
CXY Harrisburg/Capital City
HAR Harrisburg FSS
HZL Hazelton
*JST Johnstown/Cambria
LNS Lancaster
LBE Latrobe
AOO Martinsburg
*MDT Middletown
*PNE Philadelphia/North Philadelphia
*PHL Philadelphia Int'l
*PSB Philipsburg Muni
*AGC Pittsburgh/Allegheny County
*PIT Greater Pittsburgh Int'l
*RDG Reading
7TB Tobyhanna
*AVP Wilkes-Barre/Scranton
*IPT Williamsport
NXX Willow Grove NAS

RHODE ISLAND

BID Block Island
*PVD Providence

SOUTH CAROLINA

*AND Anderson
NBC Beaufort MCAS
*CHS Charleston AFB/Muni
*CAE Columbia Metro
MMT Columbia/McEntire ANGB
*FLO Florence
GRD Greenwood

*GSP

MYR
*CRE
*SPA
SSC

SOUT
*ABB
BKX
*HON
Y22
MHE
Y26
PHP
*PIR
RCA

*RAP
*FSD

*ATY
YKN

TENN
*TRI
*CHA
CKV
*CSV
DYR
*MKL
*TYS

*MEM
NQA
MGE
*BNA

TEXA
*ABI
DYS
*ALI
*AMA
BSM

*AUS

*BPT
NIR
BGD
*BRO
BWE
*CDS
*CLL

*CRP
NGP
NBE
*DAL
*DFW
*DHT
*DRT
DLF

*ELP

FIGURE C-1. BROCHURE: VOICE RESPON

*GSP Greer
Greenville
Spartanburg
MYR Myrtle Beach
*CRE North Myrtle Beach
*SPA Spartanburg
SSC Sumter Shaw AFB

SOUTH DAKOTA
*ABR Aberdeen Regional
BKX Brookings
*HON Huron Regional
Y22 Lemmon
MHE Mitchell
Y26 Mobridge
PHP Philip
*PIR Pierre
RCA Rapid City
Ellsworth AFB
*RAP Rapid City Regional
*FSD Sioux Falls/
Joe Foss
*ATY Watertown
YKN Yankton

TENNESSEE
*TRI Bristol
*CHA Chattanooga Lovell
CKV Clarksville
*CSV Crossville
DYR Dyersburg
*MKL Jackson
*TYS Knoxville
McGee Tyson
*MEM Memphis Int'l
NQA Memphis NAS
MGL Monteagle
*BNA Nashville

TEXAS
*ABI Abilene Muni
DYS Abilene/Dyess AFB
*ALI Alice
*AMA Amarillo Int'l
BSM Austin/Bergstrom
AFB
*AUS Austin/Mueller
Muni
*BPT Beaumont Jefferson
NIR Beeville
BGD Borger
*BRO Brownsville Int'l
BWD Brownwood
*CDS Childress
*CLL College Station/
Easterwood
*CRP Corpus Christi Int'l
NGP Corpus Christi NAS
NBE Dallas/Hensley NAS
*DAL Dallas Love
*DFW Dallas Ft. Worth
*DHT Dalhart Muni
*DRT Del Rio Int'l
DLF Del Rio/
Laughlin AFB
*ELP El Paso Int'l
FWH Ft. Worth
Carswell AFB
FTW Ft. Worth Meacham
*GLS Galveston
GDP Guadalupe Pass
*HRL Harlingen
EFD Houston
Ellington AFB
*IAH Houston
Intercontinental
*HOU Houston
William P. Hobby
JCT Junction
ERV Kerrville Muni
HLR Killeen/Hood AAF
GRK Killeen/
Robert Gray AAF
LOL Laredo
*LRD Laredo Int'l
*GGG Longview
*LBB Lubbock Int'l
REE Lubbock/Reese AFB
*LFK Lufkin
MRF Marfa Muni
*MFE McAllen
*MAF Midland Airpark
MWL Mineral Wells
PSX Palacios Muni
PRX Paris/Cox
PVW Plainview/Hale Muni
SKF San Antonio/
Kelly AFB
RND San Antonio
Randolph AFB
*SAT San Antonio Int'l
TPL Temple/Draughon-
Miller
*TYR Tyler
*VCT Victoria Regional
*ACT Waco/Madison Copper
*SPS Wichita Falls/
Shepard AFB
*INK Wink

UTAH
4BL Blanding
*BCE Bryce Canyon
U17 Bullfrog
*CDC Cedar City
DPG Dugway/Tooele/
Michael AAF
U28 Green River
4HV Hankesville
*MLF Milford Muni
CNY Moab
HIF Ogden/Hill AFB
*OGD Odgen Muni
PUC Price
*SLC Salt Lake City Int'l
VEL Vernal
*ENV Wendover

VERMONT
*MPV Barre-Montpelier
*BTV Burlington Int'l
RUT Rutland
VSF Springfield

VIRGINIA
BKT Blackstone
*CHO Charlottsville-
Albemarle
WAL Chincoteague
*DAN Danville
PSK Dublin
DAA Ft. Belvoir
FAF Ft. Eustis
LFI Hampton
HSP Hot Springs
*LYH Lynchburg Muni
*PHF Newport News
*ORF Norfolk Int'l
NGU Norfolk NAS
NTU Oceana
NYG Quantico
*RIC Richmond/Bird Int'l
*ROA Roanoke
*SHD Staunton/Waynesboro/
Harrisonburg/
Shenandoah Valley

WASHINGTON
*BLI Bellingham Int'l
PWT Bremerton
63S Colville
*EPH Ephrata Muni
PAE Everette Snohomish/
Paine
HQM Hoquiam
MWH Moses Lake/
Grant County
OLM Olympia
4OM Omak
*PSC Pasco/Tri-Cities
NOW Port Angeles CGAS
CLM Port Angeles/
William R. Fairchild
Int'l
PUW Pullman Moscow
UIL Quillayute
RLD Richland
*BFI Seattle/Boeing Field/
King County Int'l
*SEA Seattle-Tacoma Int'l
SHN Shelton
SKA Spokane/Fairchild AFB
SFF Spokane/Felts Field
*GEG Spokane Int'l
SMP Stampede Pass
GRF Tacoma/Ft. Lewis AAF
TIW Tacoma Industrial
TCM Tacoma/McChord AFB
TDO Toledo
*ALW Walla Walla City
County
*EAT Wenatchee Pangborn
NUW Whidbey Island NAS
*YKM Yakima Air Terminal

WEST VIRGINIA
*BKW Beckley
*BLF Bluefield
*CRW Charleston
*CKB Clarksburg
*EKN Elkins
*HTS Huntington/Tri-State/
Walker-Long
*MRB Martinsburg
*MGW Morgantown
*PSB Parkersburg
*HLG Wheeling
SSU White Sulphur Springs

WISCONSIN
VOK Camp Douglas
*EAU Eau Claire County
GRG Green Bay/
Austin-Straubel
JVL Janesville/Rock County
*LSE LaCrosse
LNR Lone Rock
*MSN Madison Dane County/
Traux
MTW Manitowoc
*MKE Milwaukee/
General Mitchell Field
MWC Milwaukee/Lawrence
J. Timmerman
CWA Mosinee
OSH Oshkosh/Wittman
RHI Rhinelander/
Oneida County
*AUW Wausau Muni

WYOMING
BPI Big Piney
*CPR Casper/Natrona
County
*CYS Cheyenne Muni
COD Cody Muni
4DG Douglas
EVW Evanston
GCC Gillette-Campbell
County
*JAC Jackson Hole
*LND Lander
*LAR Laramie/Brees
*RWL Rawlings
*RIW Riverton
*RKS Rock Springs
*SHR Sheridan County
*WRL Worland

80-50-A-1D

VOICE RESPONSE SYSTEM (Sheet 4 of 4)

ERRATA SHEET

FROM	TO
ARIZONA	ARKANSAS
JBR Jonesboro	JBR Jonesboro
CALIFORNIA	CALIFORNIA
CRG Carlsbad	CRQ Carlsbad
VVG Lompoc/Vandenberg AFB	VBG Lompoc/Vandenberg AFB
FLORIDA	FLORIDA
SRO Sarasota/Bradenton	SRQ Sarasota/Bradenton
St Petersburg/Clearwater	St Petersburg/Clearwater
ILLINOIS	ILLINOIS
MYN Mt. Vernon	NVN Mt. Vernon
KANSAS	KANSAS
FOE Topeka/Forber Field	FOE Topeka/Forbes Field
MISSISSIPPI	MICHIGAN
JXN Jackson County/	JXN Jackson County/
Reynolds Field	Reynolds Field
MISSOURI	MISSOURI
JRK Kirksville	IRK Kirksville
WEST VIRGINIA	WEST VIRGINIA
PSB Parkersburg	PKB Parkersburg
WISCONSIN	WISCONSIN
GRG Green Bay/Austin-Straubel	GRB Green Bay/Austin-Straubel

TELEPHONE NUMBER

Change the area code for MANSFIELD from (614) to (419)

80-50-A-2A

FIGURE C-2. OTHER USER INFORMATION (Sheet 1 of 5)

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

October 22, 1979

TO: All Pilots in the Columbus Area

SUBJECT: Columbus, Ohio, Demonstration of the Voice Response System

On or about November 18, 1979, the Federal Aviation Administration (FAA) will conduct a demonstration of the computer generated Voice Response System (VRS) in the Columbus, Ohio, Flight Service Station (FSS) area. This automated weather dissemination system has been developed to evaluate the concept that a pilot can receive limited preflight weather products directly from a computer. An approximate 4-month evaluation is planned.

Material presented in the VRS is current weather data as reported at the time of access. The demonstration system provides three preflight weather products: hourly surface observations, terminal forecasts, and forecast winds aloft. Although the three products currently available will not provide a complete preflight weather briefing, they will enable pilots to make important early flight planning decisions prior to their contacting an FSS specialist for briefing and flight plan filing.

The enclosed brochure contains instructions on how to use and operate the system. Applicable phone numbers for toll-free access from Columbus, Mansfield, Lancaster, Newark, and Marion are included. Normally, 24-hour-a-day availability of service can be expected but because this VRS is an experimental system, with limited redundancy, some occasional system outages may occur.

Maximum pilot participation in this demonstration is encouraged. Pilots contacting the Columbus FSS should advise the specialist at the beginning of their briefing if they used the VRS for early flight planning and indicate the approximate time of the most recent VRS call. This information regarding your utilization of VRS data will enable the FAA to determine what effect a limited VRS capability has on FSS operations. We urge you to help us evaluate this new concept. Your assistance is welcomed and appreciated.

Sincerely,

ROBERT W. WEDAN
Acting Director, Systems Research
and Development Service

Enclosure

80-50-A-2B

FIGURE C-2. OTHER USER INFORMATION (Sheet 2 of 5)

IMPORTANT MESSAGE

BECAUSE OF DIFFERENCES IN THE DESIGN OF THE NEWARK AND MANSFIELD TELEPHONE EXCHANGES, IT IS IMPORTANT THAT PILOTS USING THESE EXCHANGES MAKE SURE THAT THEIR CALL HAS BEEN COMPLETED SO THAT THE VRS SYSTEM IS AVAILABLE FOR THE NEXT CALLER. TO INSURE THIS, PILOTS SHOULD REMAIN ON LINE UNTIL THE SYSTEM INQUIRY "DO YOU NEED MORE INFORMATION? ANSWER YES OR NO." WHEN THE PILOT HAS DECIDED THAT NO ADDITIONAL INFORMATION IS NEEDED, A RESPONSE OF "N" '#''#' MUST BE ENTERED. THE VRS SYSTEM THANKS THE PILOT AND SIGNALS THAT THE CALL HAS BEEN COMPLETED. THIS ACTION MAKES THE SYSTEM AVAILABLE TO THE NEXT CALLER. FAILURE TO FOLLOW THE ABOVE PROCEDURE WILL LIMIT THE NUMBER OF CALLS HANDLED PER UNIT TIME IN THE MANSFIELD AND NEWARK EXCHANGES.

January 4, 1980

80-50-A-2C

FIGURE C-2. OTHER USER INFORMATION (Sheet 3 of 5)

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20591

DATE: JAN 8 1980

IN REPLY REFER TO: ARD-420

SUBJECT: Columbus, Ohio, Demonstration of the Voice Response System

FROM: Acting Director, Systems Research and Development Service, ARD-1

TO: All Pilots in the Columbus FSS Area

The Federal Aviation Administration, by letter dated October 22, 1979, advised of a demonstration in the Columbus FSS area of a computer-generated Voice Response System (VRS). This system provides direct pilot access through push-button telephones to limited aviation information. The demonstration will continue to April. Included with the letter was a brochure which provided instructions on how to use the system, applicable phone numbers for toll-free access and a list of LOCATION IDENTIFIERS. This letter is to advise you of some of the changes that have occurred since our last communication and to bring you up to date on the current situation. The Newark telephone number has been changed effective December 27, 1979, due to technical problems. The new number for Newark is (614) 323-2112.

Technical problems have been encountered in the Mansfield area also. For the pilots in the Mansfield area, engineering solutions to some of your problems are being explored with the telephone company to provide more satisfactory service.

We would like to take this opportunity to inform you of typographical errors we have found in the brochure since its issuance date, October 1, 1979. The corrections are listed in the enclosed errata sheet. We are sorry for the inconvenience these errors may have caused you.

If there are any questions concerning the VRS, please call (609) 641-8200, extension 3734, from 8:30 am to 4:30 pm, or you may call the Columbus Flight Service Station at (614) 237-8020 during administrative hours.

Thank you for your participation and cooperation.

ROBERT W. WEDAN

Enclosure

80-50-A-2D

FIGURE C-2. OTHER USER INFORMATION (Sheet 4 of 5)

NOTE

TWELVE-KEY PUSHBUTTON TELEPHONES ARE READILY AVAILABLE IN THE COLUMBUS, OHIO, AREA FROM THE TELEPHONE COMPANY. TWELVE-KEY PUSHBUTTON ACOUSTIC COUPLING DEVICES MAY BE PURCHASED FROM ELECTRONIC SHOPS OR TELEPHONE STORES.

THE FOLLOWING TELEPHONE NUMBERS MAY BE USED TO ACCESS THE VRS IN THE COLUMBUS FLIGHT SERVICE AREA.

COLUMBUS	(614) 461-1659
LANCASTER	(614) 654-5457
MARION	(614) 382-1777
MANSFIELD	(419) 525-2955
NEWARK	(614) 345-1493

80-50-A-2E

WATCH AM WEATHER WOSU CHANNEL 34 COLUMBUS,OHIO

80-50-A-2F

FIGURE C-2. OTHER USER INFORMATION (Sheet 5 of 5)

APPENDIX D

UNSOLICITED LETTERS

Beasley Industries, Inc.

James C. Whitt
Pilot/Photographer

December 12, 1979

VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City, NJ 08405

Gentlemen:

After using your voice responce system, I am very pleased with the service, speed of service, and clarity of the computer. Hopefully, this system will stay in operation and I can see utilization being very helpful to the pilots.

I, like many other pilots, spend too much time on the telephone waiting for the weather to file a flight plan. This system will free the briefers for taking flight plans and give detailed weather information as needed.

Just wanted to give my support to this system.

Sincerely,

James C. Whitt
Corporate Pilot

JCW:kc

FIGURE D-1. UNSOLICITED LETTERS (Sheet 1 of 5)

William E. Huff
8080 Kingsley Dr.
Reynoldsburg, Ohio
43068

FAS
DOT/FAA/NAFEC
ANA-230
ATLANTIC City
NEW JERSEY 08405

GENTLEMEN.

I [illegible]

SINCERELY,

[signature]

FIGURE D-1. UNSOLICITED LETTERS (Sheet 2 of 5)

MADISON AVIATION CENTER, INC.

Phones: 614-852-1914
614-878-1693
513-323-6962

1281 U.S. Rt 40, SW
London, Ohio 43140

December 8, 1979

VRS
DOT/FAA/NAFEC
ANA-250
Atlantic City,New Jersey 08405

Gentlemen:

After utilising the voice response system, we had a positive first impression. The system seems to cover all the necessary weather information. However, we feel that the system would be much more effective if it were to have a list of NOTAM'S on file.

Sincerely yours,
Blair Sullivan
Greg Schwall
Blair Sullivan - CFI
Greg Schwall

FIGURE D-1. UNSOLICITED LETTERS (Sheet 3 of 5)

MEDICAL ARTS LABORATORY

OKLAHOMA CITY OKLAHOMA

Jaunary 14, 1980

VRS
DOT/FAA/NAFEC
ANA/250
Atlantic City, N.J. 08405

Gentlemen:

I recently had the opportunity to try out the computer generated VRS installed in Washington, D.C. What a tremendous advance!

The quality of the reports and quantity of information given is infinitely better than I have ever received from any flight station ever. Further, the organizational discipline imposed by the computer system vastly improved my own planning (something in which I personally take great pride).

If the current weather products available could be expanded by area forecasts and route summaries, this would be a truly invaluable aviation weather tool.

There should be a tremendous relief of the workload on flight service station personnel if the above weather product could be added and the system implemented nationwide. One would need to trouble scarce flight service station personnel only for the obtaining of current notams, appropriate radar summaries and pireps, then file a flight plan and go. From the clever formatting employed, it might even be able to file flight plans directly into the computer using touchtone telephone pads.

Again, my compliments on the VRS system.

Sincerely yours,

Perry A. Lambird, M.D.

PAL:sky

cc: AOPA
FAA

FIGURE D-1. UNSOLICITED LETTERS (Sheet 4 of 5)

ARD-1/L 400

GEORGE N. BATES, M.D.
Chairman of the Board
JOSEPH K. GILMORE
President

PHYSICIANS INSURANCE COMPANY OF OHIO

BATES DRIVE
P.O. BOX 281
PICKERINGTON, OHIO 43147
(614) 864-7100

February 4, 1980

Robert W. Wedan, Acting Director
Systems Research and Development Service, ARD-1
Department of Transportation
Federal Aviation Administration
Washington, D.C. 20591

Dear Mr. Wedan:

Allow me to inform you that the voice response system available to pilots in the Columbus, Ohio flight service station area has been of assistance to me many times. It would be very helpful if this service were some how made to become permanent. I am a multi-engine instrument pilot with business concerns in Louisville, Kentucky; Indianapolis, Indiana; Lansing, Michigan; and Charleston, West Virginia and this system allows me to be up-to-date on weather regionally without tying up any flight service station personnel.

If it would be appropriate, I will be glad to formalize my recommendation as you might instruct.

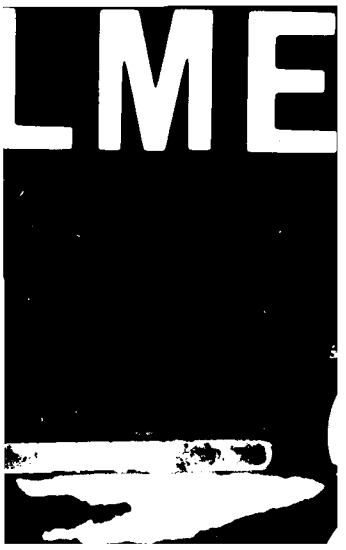
Sincerely,

David L. Rader
Sr. Vice President

DLR/skb

FIGURE D-1. UNSOLICITED LETTERS (Sheet 5 of 5)

U.S. GOVERNMENT PRINTING OFFICE: 1981 0 — 703-067/41


LME